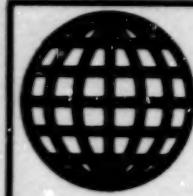


JPRS-TND-89-004  
28 FEBRUARY 1989



FOREIGN  
BROADCAST  
INFORMATION  
SERVICE

# ***JPRS Report***

## **Nuclear Developments**

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# Nuclear Developments

JPRS-TND-89-004

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**Power Industry To Import Soviet Nuclear Units**  
*HK2401124789 Beijing CEI Database in English*  
*24 Jan 89*

[Text] Beijing (CEI)—China will import nuclear power units from the Soviet Union to develop its nuclear power industry, according to a senior Chinese official.

Huang Yicheng, minister of energy, said on January 20 that the import would be in the form of barter trade. They will be installed in the economically developed east China where its electric shortage is acute.

Huang said it is too expensive at present to manufacture these units by China itself.

The minister said China plans to have a nuclear power generating capacity of 30 billion kilowatt-hours by the year 2000.

Two nuclear power stations are under construction in China—Qinshan Nuclear Power Station and Daya Bay Nuclear Power Station.

**Country May Buy Nuclear Power Plant From USSR**

*HK1602091989 Beijing CHINA DAILY*  
*in English 16 Feb 89 p 2*

[By staff reporter]

[Text] Speculation on the possibility of China buying a Soviet nuclear power plant has been fueled with an invitation sent out from Beijing by the Ministry of Energy Resources.

It has invited a delegation from the Soviet nuclear power industry which will have talks next month with officials of the ministry, the China Nuclear Industry Corporation and the Northeast China Electric Power Administration.

Experts say views will be exchanged on the possibility of selling a nuclear power plant to China through the barter trade. The coming meetings are also being seen as forerunners for the idea to be discussed at the summit meeting between the Chinese and Soviet leaders in May.

They said China has been considering a plan to build a nuclear power plant using Soviet prototype reactors in Northeast China's Liaoning Province where many heavy industries are located.

Liaoning officials are keen on the proposal for the province is expected to be short of 5,000 megawatts of generating capacity by the year 2000.

Such is the provincial enthusiasm that seven million yuan has already been spent on selecting a site for the proposed plant.

The experts pointed out that the Soviet delegation's visit would be a return for that of Shi Dazhen, vice-minister of energy resources, who went on an unannounced trip last year to the Soviet Union and some East European countries.

**Export of Nuclear Energy Products Up**  
*HK0102055089 Beijing CHINA DAILY in English*  
*1 Feb 89 p 2*

[Article by staff reporter Xu Yuancho]

[Text] China's exports of products for peaceful use of nuclear energy have increased steadily since the country launched a massive drive to turn its military industries to civilian production a few years ago.

The China Nuclear Industry Corporation (CNIC) exported \$38-million worth of nuclear products last year to around 15 countries and regions including the United States, West Germany, France, Japan and Australia, a CNIC official said in Beijing.

He said the exported products included natural uranium, other metals and mini-reactors.

Last year's exports were 10 percent over the annual plan and had a value 20 percent higher than in 1987.

The corporation earned \$17.8 million last year from technical services to cooperative projects in other countries.

CNIC, the former Ministry of Nuclear Industry, has successfully accomplished its planned transfer of nuclear industry from military to civilian use.

Over 90 percent of the factories in nuclear industry now make civilian products. The total civilian production value was 507 million yuan, about 33.7 percent of the total industrial output value in the industry.

This figure is expected to reach 800 million yuan by 1990, compared with only 80 million yuan in 1980 when the change started.

Some new products such as plasma paint spraying machines, numerical-controlled plasma cutting machines and computer-controlled embroidery machines were put into partial production in 1988.

Construction of nuclear power plants at Qinshan in Zhejiang Province and at Daya Bay in Guangdong Province progressed steadily in the past year.

Several technical problems have been solved for the first stage of the Qinshan plant. The safety shell for the 300 megawatt reactor has been sealed and the pressure container for the reactor has been moved into position, the official said.

The first stage of the Qinshan plant is expected to be put into operation by the end of next year. Two other reactors with a capacity of 1,200 megawatts will be built as its second stage.

Construction of the safety shell for the first 900-megawatt reactor at Daya Bay plant is also on track. It has already exceeded a height of 22 metres.

**Leads in Missile Technology Examined**  
HK0902054489 Hong Kong ZHONGGUO TONGXUN  
SHE in Chinese 1240 GMT 2 Feb 89

[Report: "China Leads the World in Strategic Missile Nuclear Weapon's Measuring and Controlling Technology"]

[Text] Beijing, 2 Feb (ZHONGGUO TONGXUN SHE)—The guided missile's micro-CAMAC [Computer-Automated Measurement and Control] system, which passed a technical appraisal some time ago, has enabled China to stand in the front ranks of the countries of the world in terms of measurement-and-control technology for strategic missile nuclear weapons and large carrier rockets.

The measuring and controlling system is a key part of a strategic missile. Its accuracy has a direct bearing on whether or not we can successfully launch a strategic nuclear weapon or a large carrier rocket; its measuring and controlling speed affects the weapon's survival capacity. In the early 1980's, measuring and controlling systems at home and abroad basically depended on hand operations, and the low measuring accuracy, long duration, and operators' high labor intensity were liable to produce errors.

In 1981, after conducting repeated investigations, studies, and argumentations, a research institute of the Chinese Second Artillery Corps defined a research topic for the Second Artillery's overall program for measuring the automation of weapons and equipment, and set up a team of seven young scientists and technicians to tackle the problem. Without any previous experience, the team conducted bold explorations and then put forward a crucial line of applying the modern, high-technology microsystem and the international standard interfacing CAMAC system in the development of automatic measuring and controlling technology. Though arduous work, it succeeded in verifying this creative idea.

The above-mentioned measuring and controlling system is reported to have been verified in a firing exercise not long ago.

**Nuclear Accident Emergency Plans Devised**  
HK1502061289 Beijing CHINA DAILY in English  
15 Feb 89 p 5

[Article by staff reporter Yang Xiaoping]

[Text] The construction of nuclear power plants in Qinshan, Zhejiang Province, and Daya Bay, Guangdong Province, have encouraged scientists to devise plans in case of accidents.

Wang Zuoyuan, an associate professor of radiation protection and director of the Laboratory of Industrial Hygiene under the Ministry of Public health in Beijing, is one of these scientists.

Wang said that the purpose of emergency planning is to protect the people working or living around nuclear power plants from radiation if an accident occurs.

For instance, he explained, when an accident happens, nearby hospitals should know how to protect people from iodine radiation. The radioactive iodine released in a nuclear accident could cause thyroid gland diseases.

On April 26, 1986, a serious accident at the Chernobyl nuclear power plant in the Soviet Union killed 31 people and injured hundreds.

As the cloud of radiation released by the accident travelled outwards, Wang's laboratory's 44 monitoring stations began to collect and analyse the residue. A check one month after the accident found that, although radiation levels were a little higher than normal north of the Yangtze River, the air did not contain enough radiation to harm people's health.

With the increasing use of nuclear energy in industry, agriculture, and medicine, Wang said that radiation accidents were not only limited to nuclear power plants or reactors.

"Good management is very important in the wide application of nuclear energy," he said. Strict reporting and protection systems and dissemination of information about protection, according to Wang, can reduce the number of accidents.

Wang said that his laboratory would hold three or four short-term training courses each year for personnel whose work involves radiation.

"Nuclear safety also has attracted attention from the government," he said. To ensure the safe use of nuclear energy in China, the National Nuclear Safety Administration was founded in 1986. The establishment of a nuclear accident emergency planning commission is under discussion.

Wang, one of the four Chinese members of the International Commission on radiological Protection, said that his laboratory has conducted a series of studies on the connection between radiation and cancer.

Professor Wei Luxin, China's representative to the United Nation's Scientific Commission on Effects of Atomic Radiation, and his colleagues from the institute began a 14-year research project in 1972. Their studies took place in Guangdong's Yangjiang County, where the level of ionizing radiation is about three times higher than that in ordinary areas.

The radiation comes from a hill and a mountain, from which fine particles of monazite—a type of rock with rich content of uranium and thorium—are washed down continually by rains and deposited in the soil. Consequently, the natural radiation in the area is intensified.

The research was aimed at finding out if the local people suffered any detrimental effects from continuous low-level exposure.

Wei and his group found no significant difference in cancer mortality, the incidence of hereditary diseases and congenital malformations between Yangjiang and their control area. The one exception was a slightly higher percentage of chromosome aberrations in the high-radiation area.

"The results suggested that the normal release from a nuclear power plant would not harm people's health," Wang said.

In co-operation with the scientists from the National Cancer Institute of the United States, the Beijing laboratory, which was founded in 1965, started a study of the effects of low-level radiation on thyroid gland diseases in 1987.

"The American scientists have found the incidence of thyroid gland diseases among the aged and children living near a nuclear waste storage site in Pennsylvania is higher than in ordinary areas. We will try to confirm that in our research in China," Wang said.

Among the 2,000 people they investigated—1,000 in Yangjiang and 1,000 in Enping County, an area with ordinary radiation levels—the scientists found the incidence of goiter was higher in Yangjiang and the incidence of other thyroid diseases was almost the same.

Last year, the scientists from the laboratory conducted a joint study with the University of Southern California to study the effect of radiation on children's intelligence.

"Though it is still early to draw any conclusion since we just surveyed 200 cases, scientists in other countries have shown if the women receive X-rays during the eighth to 15th week of pregnancy, their children's intelligence will be affected," the director said.

In recent years, Wang continued, scientists have showed great interest in radon, a radioactive gas in the air. In some countries, such as the United States, Great Britain, France and Japan, radon content in the air has been set as one of the criteria to evaluate new housing.

"Some research has discovered that one of the causes of the high incidence of lung cancer among miners is the high radon levels in mines," he said.

To reveal the relationship between radon content and lung cancer, a study was carried out last year to find out the average radon levels inside China's buildings.

Wang said their research found that radon levels were higher in Northwest China's cave dwellings, in rooms with bad ventilation and in houses built with coal residue in southern China. "Our next step is to investigate the incidence of lung cancer in those high radon level areas," he added.

Wang said they hoped to carry out the research in co-operation with scientists from the U.S. National Institute of Environmental Health Science.

JAPAN

**USSR Atomic Power Commission Seeks Aid**  
*OW2701045089 Tokyo KYODO in English*  
*1141 GMT 26 Jan 89*

[Text] The head of the Soviet state committee for the utilization of atomic power announced plans Thursday to shut down two reactors near earthquake-stricken Armenia and to request Japanese technical cooperation in preventing future earthquake damage to atomic plants.

Aleksandr Protsenko, in Tokyo for an international symposium on atomic energy, told reporters that, although the two plants were not damaged in the Armenian quake, making them earthquake resistant was prohibitively costly.

Though the new emphasis on safety and public awareness has raised costs, Protsenko said that Soviet policy still aimed at increasing the production of atomic power.

The Soviet official also confirmed the presence of widespread nuclear contamination resulting from an accident at an atomic weapons facility in the Ural Mountains in late 1957.

He added that a report would be released publicly in the near future after the ongoing comprehensive analysis of the accident was completed.

**Law on Nonnuclear Principles Slated for Diet**  
*OW0802113789 Tokyo KYODO in English*  
*1004 GMT 8 Feb 89*

[Text] Tokyo, Feb 8 (KYODO)—A committee of parliamentarians and opinion leaders announced plans Wednesday to submit a bill to the Diet making Japan's three "nonnuclear" principles" legally binding.

The bill, to be drawn up by the end of March, would make enforceable a Diet resolution banning the manufacture, possession, and introduction of nuclear weapons.

The proposed bill would also include punishment for violators, according to Mariko Taniuchi, spokeswoman for the group called the Japan Committee of 22 for Nuclear Disarmament.

Many antinuclear activists believe that U.S. forces visiting or stationed in Japan have brought nuclear weapons onto Japanese territory.

The United States has a policy of neither confirming nor denying the possession of nuclear weapons by its forces overseas, while the Japanese government says that in the absence of any U.S. request for consultations on the matter it assumes the nonnuclear principles are being adhered to.

Upper House Diet member Tokuma Utsunomiya of the Shinsei Club-Zeikinto leads the group, which includes 10 parliamentarians from the ruling Liberal Democratic Party and major opposition parties, the mayors of Hiroshima and Nagasaki, and prominent academics.

The committee plans to host a series of symposiums around the nation later this year to raise public support for the proposed legislation.

## POLAND

### Government Committee Discusses Nuclear Energy

AU31011516.29 Warsaw TRYBUNA LUDU in Polish  
27 Jan 89 p 6

[Article by Krystyna Panek: "The Facts and Myths About Nuclear Energy"]

[Excerpts] The building of a nuclear power station in Zarnowce, and plans for a second one in Klempicz, are causing many fears. Because of objections to the Polish nuclear energy program voiced by scientists in Gdańsk, the residents of Wrocław, and the People's Council of Wronki—not to mention an open letter from the residents of Darłowo and a demonstration in Lublin—the Council of Ministers' Sociopolitical Committee decided to hold a meeting on 26 January to discuss the socioeconomic reasons behind the development of nuclear energy.

The meeting was attended by Morris Rosen, director of the Department of Security of the IAEA [International Atomic Energy Authority], and Abel J. Gonzales, chief of Radiation Protection at the IAEA. It was chaired by Aleksander Kwasniewski, chairman of the Sociopolitical Committee.

It is a fact that our economy is about 2 and ½ times more energy-intensive than West European economies, said Jerzy Bijak, deputy minister of Industry. Therefore, it would be impossible and irrational to continue with the present intensive energy expansion policy. It is essential to restructure the economy in such a way that energy consumption is rationalized. It is also necessary to alter the structure of energy sources, reduce prices, increase the efficiency of energy processes, and so on. These tasks are contained in the relevant programs.

However, according to present analyses, these undertakings will not be enough to balance out Poland's energy consumption. Unless we implement a nuclear energy program, we will have an energy shortage of between 1,500 and 2,000 megawatts in about the year 2020. The fact that this form of energy is less harmful to the environment is also important. [passage omitted]

Wrong information about plans to build the "warta" nuclear plant in Klempicz and a failure to discuss these plans with the local population led to protests from people in and around Wronki, said Kazimierz Gott, chairman of the Wronki People's Council. The long Sociopolitical Committee debate was an attempt to clear

many doubts and assess the advantages and disadvantages of nuclear energy. Although it was not possible to dispel every fear and myth, the first major step toward open discussion and an exchange of views about nuclear energy was made.

### Kwasniewski Statement on Nuclear Energy

AU0202170389 Warsaw RZECZPOSPOLITA in Polish  
27 Jan 89 p 5

[Statement given to RZECZPOSPOLITA by Aleksander Kwasniewski, chairman of the Council of Ministers Sociopolitical Committee, following a meeting of this committee on 26 January]

[Text] A great deal of emotion has built up around the question of nuclear energy and, unfortunately, a great deal of misunderstanding as well. Society's emotion is understandable, especially in communities that are close to future nuclear power stations. Scientific circles are also divided in their assessments of the impact of nuclear energy on the environment and on the safety of citizens, and are in disagreement over the expediency of seeking alternative energy sources. Our aim during the meeting was to discuss these topics calmly with the relevant people, including experts from the IAEA.

One thing in Poland is certain. We need new energy sources. Our balance of energy also demands this. The possibilities are clear. Either we continue to expand coal mining and develop energy production based on this source, or we seek solutions based on nuclear technology. We think we should attempt these latter solutions, but only under complete security and with a complete awareness of its possible impact on the environment. Most of all, however, we must convince society that this devil is not so frightening, that nuclear energy is not as dangerous as it is made out to be. And that was the purpose of today's meeting.

Will the presence of international experts at this meeting convince people? I do not think one can dispel years of fear with just one meeting, however fruitful it is. However, I believe that when we have learned more and started to talk to the people involved, for example, the residents of Wronki, which is close to the site of the power station at Klempicz, we will succeed in obtaining rational views from the public. We do not wish to hide anything. The question of nuclear energy must be resolved. All its dangers and benefits must be revealed. But all this should take place during calm, businesslike discussions, during exhaustive exchanges of opinions. Only later can the essential decisions be taken. They will only be taken when it is certain that all the dangers that give rise to even the mildest of fears will be avoided.

## BRAZIL

### Depleted Uranium To Be Received From UK

#### 30 Tons Stockpiled

51002044 Sao Paulo FOLHA DE SAO PAULO  
in Portuguese 8 Jan 89 pp A1, C1

[Article by Tania Malheiros: "Brazil To Receive 30 Tons of Atomic Waste From Angra I Which Was Stockpiled in England"]

[Text] The president of Nuclear Industries of Brazil (INB), John Albuquerque Forman, 50, told FOLHA that about 30 tons of depleted uranium (rejects), which belong to Brazil but are stockpiled in England, are supposed to be transferred to the enterprise's facilities in Resende (161 km from Rio). The stock is made up of uranium left over from what was used to make two refueling loads for the Angra I nuclear power plant in Angra dos Reis (154 km from Rio). If the government should decide that it "has to dispose of" the stock, Forman said that it would have to pay England about \$3 million (2.4 billion cruzados, at the official exchange rate).

The INB president said that the Brazilian Government was looking into the possibility of taking the stock, because the uranium in question could be used by the fast-breeder reactor that produces and consumes fissionable material (that is fissioned by thermal neutrons, such as uranium and plutonium), but its production is greater than consumption. "And what if Brazil should have one of these reactors one day?" Forman asked.

The president of the National Nuclear Energy Commission (CNEN), Rex Nazareth, who coordinates Brazil's nuclear program, said about a year ago that the country could develop a project for this reactor with the Argentine Government.

Forman said during the 2 and 1/2 hour interview granted last Friday at the enterprise's headquarters in downtown Rio that the process for moving the uranium is "simple and safe." According to him, the material would be transported by ship in containers.

Forman said that Brazil has not paid anything for storing the material in England, which has other stockpiles of enriched uranium in its territory. "This is common there," he explained. Nazareth said last 30 December that Brazil could have a "unit to enrich what we call depleted uranium in Resende."

Nazareth also said on that occasion that "this unit would serve to make better use of the uranium" employed by the PWR (pressurized water reactor). This reactor from the United States that uses pressurized water is one of the most modern in the world. The Angra I nuclear plant has one of these, which requires uranium enriched to between 2.5 and 3.2 percent to operate.

#### Negotiation

Forman said that Brazil was negotiating with England to buy the enrichment of the uranium to this percentage in order to begin manufacturing a third refueling load for Angra I. The second load is ready, stockpiled in Resende, and should be introduced in the plant in October of this year.

To have the third fuel load for Angra I, the INB will have to send around 16 tons of yellow cake (enriched uranium) to France, which will convert it into hexafluoride (gas). The hexafluoride will then go to England, where it will be enriched to 2.5-3.5 percent, before being shipped back to Brazil, to the INB's Fuel Elements Plant (FEC) in Resende. At this plant, uranium in the form of tablets goes through its final processing to convert it into the fuel that feeds the plant's reactor.

The INB has replaced Nuclebras, the state enterprise created about 13 years ago on the basis of the nuclear agreement signed between Brazil and Germany to manage the Angra 2 and Angra 3 plants. According to Forman, the INB today is purely industrial.

#### Costs

Five months ago, processing yellow cake into hexafluoride and then into enriched uranium cost about \$13 million (11.7 billion cruzados) on the international market. To obtain the refueling load for the plant at that time, Furnas Centrais Eletricas (the company managing the nuclear facility) would have paid the INB about 8.6 billion cruzados.

Angra I needs to be refueled every year for its operations. The INB already has a chronogram for manufacturing the fourth refueling load for the plant. Holland and Germany may also enrich uranium for Angra I, because they, like England, have signed an agreement to this effect with Brazil.

#### Material 'Not Waste'

51002044 Sao Paulo O ESTADO DE SAO PAULO  
in Portuguese 10 Jan 89 p 16

[Text] Brasilia—There are over 50 tons of depleted uranium belonging to Brazil and stockpiled in England that are to be returned to the country at a date as yet undefined. The mineral, which is not atomic waste, will be processed in Resende, Rio de Janeiro, by Nuclear Industries of Brazil (INB), at its nuclear fuel manufacturing facility. This information was provided by INB President John Milnes Albuquerque Forman, who denied yesterday that Brazil would be receiving 30 tons of Angra I atomic waste that was in England.

John Forman said that the depleted uranium—left over from part of the natural uranium sent to England for enrichment so that it could be used to fuel the Angra I

plant—had considerable commercial value. According to him, the country needed to keep it under its control and should use it as a fuel for a future fast breeder reactor.

"This material is of strategic importance to Brazil. It is not atomic waste, and we are therefore maintaining contacts to bring the depleted uranium back in the medium term," Forman explained. "One option might be to leave the mineral there for the British without having to pay storage costs."

#### Munitions

The national defense industry has expertise in metallurgical technology for depleted uranium and it is prepared to use this material in two ways: in making supersonic ammunition for 30-mm to 155-mm guns; and in recoating the armor of combat vehicles. According to Engineer Carlos Friulli from the Army's Technological Center, "the uranium can be used advantageously to replace the tungsten core currently employed to make kinetic darts (projectiles) developed in the country."

Its use as the external shield for tanks and armored cars is easier. The Soviets cover their more sophisticated model, the T-80 (125-mm gun) with dozens of small boxes whose bottom and three sides are made of uranium. Inside are the detonating charges. The working principle is the same as for a reactor: Coming in contact with a penetrating warhead, the boxes detonate, neutralizing the destructive power of enemy fire.

#### Origin of the Uranium

Brazil sent several tons of natural uranium to England to be enriched by the ultracentrifuge process. The intention was to keep a stockpile of the fuel to operate the PWR's [pressurized water reactors] in the Angra I plant. These reactors use fissionable uranium-235 enriched up to 3.5 percent by the ultracentrifuge process. The process for enriching the mineral comprises four steps and the end-product is uranium dioxide tablets.

The leftover material from this process is depleted uranium (uranium-238), which is active and has a 0.7 percent content. It emits Alpha rays, which can be protected with a sheet of paper, unlike Beta rays, which cause radiodermatitis, and Gamma rays irradiated by cesium-137.

## INTERNATIONAL

### Text of Indo-Pakistani Pact on Nuclear Installations

51004705 Calcutta *THE TELEGRAPH* in English  
1 Jan 89 p 1

[Text] Islamabad, Dec. 31 (UNI)—India and Pakistan today agreed to desist from any action aimed at causing the destruction of, or damage to, any nuclear installation or facility in each other's country.

The agreement will come into force from the date on which the instruments of ratification are exchanged.

The following is the text of the agreement:

The government of the Islamic republic of Pakistan and the government of the republic of India, hereinafter referred to as the contracting parties, reaffirming their commitment to durable peace and the development of friendly and harmonious bilateral relations, conscious of the role of confidence-building measures in promoting such bilateral relations based on mutual trust and goodwill, have agreed as follows:

#### Article I

1. Each party shall refrain from undertaking, encouraging or participating in, directly or indirectly, any action aimed at causing the destruction of, or damage to, any nuclear installation or facility in the other country.

2. The term "nuclear installation or facility" includes nuclear power and research reactors, fuel fabrication, uranium enrichment, isotopes separation and reprocessing facilities as well as any other installations with fresh or irradiated nuclear fuel and materials in any form and establishments storing significant quantities of radioactive materials.

#### Article II

Each contracting party shall inform the other on 1st January of each calendar year of the latitude and longitude of its nuclear installations and facilities and whenever there is any change.

#### Article III

This agreement is subject to ratification. It shall come into force with effect from the date on which the instruments of ratification are exchanged.

Done at Islamabad on this 31st day of December, 1988, in two copies each in Urdu, Hindi and English, the English text being authentic in case of any difference or dispute on interpretation.

## EGYPT

### Country's Need for Nuclear Weapons Contrasted to Israel's

51004603 Cairo *ROSE AL-YUSUF* in Arabic  
12 Dec 88 p 18

[Article by Dr Jihad 'Awda]

[Text] The need for strategic nuclear weapons stems from three scenarios: The state is in conflict with another state using nuclear weapons for threat and blackmail; or it is engaged in a conflict with a state that is seriously seeking or expected to succeed in the near future in possessing nuclear weapons; or it is involved in a conflict that can no longer be resolved with conventional weapons or through diplomacy. Yet it must be pointed out that the right answer should take into consideration the conflict's history in terms of diplomatic debate and armed strength. In light of this, what is Egypt's position?

At present Egypt does not possess nuclear weapons, nor is it officially seeking to possess them. Can it be said that this situation is consistent with the strategic conditions Egypt is facing in the late eighties and early nineties?

To answer this question, we must clarify the extent to which one or more of these three sources actually exists as far as Egypt is concerned. With regard to Egypt, it is certain, as it was pointed out in an earlier article, that Israel did not use nuclear weapons for threat or blackmail. As for the second scenario, the matter is different in that Israel has the capability to manufacture nuclear weapons. With regard to the third scenario, the Arab-Israeli conflict has not yet exhausted the possibility of it being resolved with conventional weapons or diplomacy.

If these answers are viewed in the light of the diplomatic debate and armed strength in the Arab-Israeli conflict, we will have a different appraisal of the strategic need from that of those who advocate the inevitability of Egypt's possessing nuclear weapons. Israel does not use nuclear weapons; indeed the conflict with it can be resolved with diplomatic methods accompanied by the use of conventional weapons. In this context the need for strategic nuclear weapons does not arise. This is as far as the past—and perhaps the present—is concerned. But as for the future, the question will arise as to the conditions under which Israel will translate its nuclear weapons-manufacturing capability into an official reality. In other words: Under what conditions, when they arise, will Israel declare that it possesses nuclear weapons?

There are three such conditions:

First: When Israel becomes certain that it will fail to achieve military victory with conventional weapons. One of the reasons for this could be the increasing economic burden of financing a conventional army which, in practical terms, might cause Israel to be financially unable to continue modernizing its weapons;

or the inability to mount an all-out mobilization in times of need; or the collapse of the Israeli currency; or for reasons relating to the evolution of political culture in the Israeli society, such as refusal on a large scale by those of military service age to fight; or for reasons relating to the balance of power, such as the balance of power with the Arab countries insisting on fighting tipping to a degree that conventional weapons will no longer be effective. Of these possibilities, only the political culture possibility is likely to happen. This is evident in the increasing number of military conscripts refusing military service in the occupied territories. Yet it must be pointed out that these represent too small a percentage to cause concern to Israeli leaders and, therefore, to become a motive for going for the nuclear option.

**Second:** In case the imposition of a Palestinian state on Israel succeeds and the Israeli society becomes divided between those who support the establishment of such a state and those who oppose it. In this case, Israel will be declared a nuclear power with the support of the opposing side in order to alleviate the fears of the opposition on one hand and deter the Palestinian state on the other. It appears that this possibility is highly likely to occur.

**Third:** In case one Arab country or a group of Arab countries, regardless of the degree of their hostility to Israel, succeed in obtaining nuclear weapons. In this case, declaring Israel a nuclear power would be a precaution against all eventualities. This condition might depend on Israel becoming certain that there are enough Arab long-range missiles to cause intolerable harm to Israeli public opinion. It appears that the possibility of an Arab nation possessing nuclear weapons is unlikely in the near future, but the possibility of acquiring missiles is more likely.

In view of the above and in the light of the current Egyptian political strategy, it can be said that Egypt is working for a dual objective, namely not to give Israel the opportunity to declare itself a nuclear power and, in the meantime, seek to make Israel acquiesce regarding peace—both politically and diplomatically. Despite the difficulty of attaining this objective because of the numerous developments, some of which might be important and beyond Egypt's ability to influence, it is still possible to achieve it through Egypt's action on the Arab and international levels and through pursuing a clear and effective strategy based on mutual deterrence and interests between the countries of the area.

Egypt's need to possess strategic nuclear weapons will stem only from the failure of this strategy. In this case Egypt's objective of possessing nuclear weapons would be for the purpose of deterring others and preserving the Egyptian state in light of the chaos and violence that are expected to dominate the area in case the peace strategy fails and Israel's position fails to develop.

## INDIA

### Reportage, Comment on Indo-Soviet Nuclear Power Act

**Details of Agreement**  
*51500062 Madras THE HINDU in English*  
*21 Nov 88 p 1*

[Text] New Delhi, Nov 10—A package for the supply of two 100 MWe VVER type Soviet pressurised light water nuclear reactors to India was formalised today with the signing of an inter-governmental agreement for the construction of a nuclear power station. The agreement was signed here by the Soviet President, Mr Mikhail Gorbachev, and the Prime Minister, Mr Rajiv Gandhi.

From the nature of the agreement, which speaks of a nuclear power station, it is clear that the two reactors will constitute the two units of one power plant. The site for the proposed station is Koodamkulam Tirunelveli district of in Tamil Nadu. The units will be set up by the Soviet Union on a turnkey basis. The cost for the entire station is about Rs 4400 crores and the Soviet Union will provide concessional State-to-State credit.

**Safety features incorporated:** The VVER type of reactors are different from the RBMK type of graphite moderated ones of the Chernobyl type and said to incorporate advanced safety features.

Under the agreement, the Soviet Union will supply enriched uranium fuel for the entire operational life of the nuclear power station. It provides for maintenance by India of a mutually agreed minimum quantity of nuclear fuel and control assemblies. Provision has also been made for the return of the spent fuel.

**Fuel for Soviet Weapons**  
*51500062 Bombay THE TIMES OF INDIA in English*  
*22 Nov 88 p 1*

[Article by S. Kumar]

[Text] Bombay, November 21—The Soviet Union will be able to make nuclear weapons from the spent fuel "gifted" by India. This bizarre implication of the Indo-Soviet nuclear agreement has been little publicised.

The agreement on the supply of two 1,000 MW nuclear reactors to India was signed by the Prime Minister, Mr Rajiv Gandhi, and the Soviet President, Mr Mikhail Gorbachov, yesterday.

India has gone out of the way and lobbied with the International Atomic Energy Agency in obtaining a special favour which waived the international safeguards applicable to the spent fuel from the Soviet-supplied reactors.

While India has to keep the spent fuel under safeguards, the moment it is handed over to the Soviet Union the safeguards will be waived and the Soviet Union will be free to do what it wants with the spent fuel and the weapon-grade plutonium present in it.

India, which always opposed the discriminatory practice of the nuclear-weapon countries, has lent itself for perpetuating the discrimination. The safeguards waiver granted in favour of the Soviet Union is not and will not be available to India.

At one time, the Soviet Union insisted that it would not agree to take back the spent fuel unless the spent fuel was free from IAEA safeguards. In other words, it refused to accept international inspection of its nuclear installations, being a superpower. Incidentally, at the IAEA while many advanced countries opposed the waiver of safeguards conditions in favour of the Soviet Union, but the U.S., for reasons best known [to]itself, did not oppose it.

A section of nuclear scientists feel that India should not agree to give back the spent fuel on a platter to the Soviet Union. India pays a price for the fuel and the spent fuel is its property. The spent fuel has a price.

Another opinion was that India should have exploited the spent fuel issue in its favour. If Soviet Union could use the fuel without safeguards, India should have sought a similar treatment. If India uses its own fuel in the Soviet-supplied reactors it will have to subject the fuel to IAEA inspection.

In the case of the Tarapur reactors, though the U.S. supplied the fuel, the spent fuel belonged to India. The Indo-U.S. agreement only provided for inspection of the facilities wherever the spent fuel is used. If the U.S. wants to take back the spent fuel, it will have to pay a price for it.

India has agreed to buy the Soviet reactors without ascertaining the economic viability of the project, informed sources point out. What will be the cost of power generated from the Soviet-supplied power reactors? There is no clear answer yet though preliminary estimates put it at Rs two per unit of electricity generated. This price will be uneconomical, as Indian reactors produced power at less than a rupee per unit.

A plain reading of the text of the agreement signed yesterday shows that many hurdles are to be crossed before India agrees to buy the reactors. The first stage is to prepare a "detailed project report". The terms of reference for the DPR should be decided.

The DPR "shall establish the detailed scope of the work of the Soviet and Indian organisations and cost estimates and economic viability for the project in accordance with the agreed financing scheme and methodology for computation of the unit energy cost".

A government spokesman, however, termed the agreement as the "best bargain, keeping our national interest intact".

#### Arms Report Denied

51500062 Bombay *THE TIMES OF INDIA* in English  
23 Nov 88 p 1

[Text] Bombay, November 22—The USSR consul-general in Bombay, Dr V. N. Egorov, today categorically denied that the Soviet Union would use spent fuel from India to make nuclear arms.

At a press conference to discuss the Soviet president, Mr Mikhail Gorbachov's visit to India, Dr Igorov said that today's report in *THE TIMES OF INDIA* to this effect was "false and motivated by vested interests. "He, however, could not comment on what the spent fuel to be imported by the Soviet Union would be used for.

Referring to the controversial Tehri hydro-electric project in Uttar Pradesh, which is to be constructed with Soviet aid, Dr Egorov stressed that no decision "to the detriment of the Indian people" would be taken.

He pointed out that the aid had been sought by the Indian government and the controversy on the feasibility of the project would have to be settled between the Indian government and the people. The Soviet Union would not interfere in this, Dr Egorov added.

He denied that increasing collaboration with multinational companies (MNCs) in the Soviet Union was an indicator of a move towards capitalism. "All the production in the country takes place within the socialist framework," he said.

However, he admitted that the MNCs were essentially exploitative by nature. "A strong trade union movement in each country is the only way of tackling this exploitation," he said.

Dr Egorov said that the Soviet Union was keen on establishing friendly relations with China but would not take a single step detrimental to the interests of India.

"The question of stability in Asia cannot be solved without the participation of China and so it is essential that India also develop good relations with China," he said.

#### Official on Fuel Transfer

51500062 New Delhi *PATRIOT* in English 9 Dec 88 p 5

[Text] The accord between India and the Soviet Union on transfer to the USSR of spent nuclear fuel available from the two reactors which the Soviet Union is to build for India on a turn-key basis is the outcome of adequate deliberations taking into account India's needs and priorities, a high official source told IPA.

There are two prime considerations which led to the decision on disposal of spent fuel from the Soviet-built reactors. The most important one is that it saves India the headache and tremendous costs of safe custody of nuclear wastes from these reactors. This in fact is the prime problem surrounding the build-up of nuclear power plants all over the world and India is no exception. It was therefore on the Indian initiative that the decision to transfer the spent fuel from the two massive Soviet reactors of 1000 MW each to the Soviet Union was arrived at.

A second consideration for the decision was to obviate the controversial problem of safeguards which would result from retaining the spent fuel in India. This could pose unnecessary problems in regard to application of International Atomic Energy Agency (IAEA) safeguards to India. These IAEA safeguards are quite stringent and the Soviet Union could not circumvent them because it is not only an IAEA member but is strict in enforcement of the safeguards in all other countries.

In terms of the Indo-Soviet accord on the proposed nuclear power station, the IAEA safeguards are now only applicable to the two Soviet-built reactors. But the retention of the spent fuel, and reprocessing it to recover plutonium for use as fuel in Indian reactors, would mean that all other plants, where plutonium recovered from the spent fuel was used, would also come under the purview of the international safeguards. This was a situation that India was not prepared to countenance. The best way out was therefore to transfer the spent fuel back to Soviet territory.

The economic dimensions of this decision have also been fully examined by the Indian side and have been found to be beneficial. The plutonium recovered from reprocessing the spent fuel is, no doubt, a valuable commodity and could be used by India in its long-term programme of fast-breeder reactors. Taking into account the well-known Bhabha strategy for India's self-reliance in the nuclear field based on fast breeders, Indian scientists have already built a mixed carbide fuel which is plutonium rich. But India will have ample supply of these spent fuels from the chain of reactors being built in India currently.

In the next decade and a half, the large number of 250 MW and 500 MW reactors to be set up by indigenous technology, for attaining the 10,000 MW target for nuclear energy, would yield ample plutonium after reprocessing the spent fuel for use in the fast-breeders programme and even to store for the future. On the other hand, the dimension of safe custody of nuclear wastes from the present and upcoming chain of N-plants would become ever larger and pose tough issues.

This question of nuclear waste disposal is a major problem which countries like USA, USSR, France, Sweden and others with very big output of nuclear energy are finding tough to deal with. In fact, some of the advanced

countries are toying with such far-fetched ideas as putting the nuclear wastes in space on satellites which could dump them on other planets.

There is yet another fancy scientific theory being worked up as a long range solution to the wastes problem, namely, to put them in orbit round the sun. Whatever be the ultimate fate of these concepts, the fact remains that disposal of nuclear wastes bristles with tremendous hazards.

**French President Offers Nuclear Cooperation**

*BK0302160689 Delhi Domestic Service in English  
1530 GMT 3 Feb 89*

[Excerpt] Addressing a news conference in Bombay after his arrival from Calcutta, Mr Mitterrand said his country is prepared to enter into a broad cooperation with India in regard to nuclear power projects. He said France is also ready to offer its expertise for the development of telecommunications and space program in India. [passage omitted]

**Pakistani Nuclear Development Causes 'Concern'**

*BK0302090489 Delhi Domestic Service in English  
0830 GMT 3 Feb 89*

[Text] Speaking at a youth rally [in Bombay], the prime minister expressed deep concern over the recent nuclear development in Pakistan. Mr Gandhi said reports from Pakistan indicate that the country has obtained tritium, which increases the power of nuclear weapons five-fold or more. Mr Gandhi stated that under these circumstances we cannot sit quiet and watch the situation. We will take the necessary steps and not allow the security of our country to be endangered. Mr Gandhi said his recent visit to Pakistan has helped to create goodwill and cooperation between the two countries.

Referring to the Afghanistan issue, Mr Gandhi expressed the hope that peace will be restored in that country. The Soviet troops will withdraw very soon and Afghanistan will be a nonaligned country.

On Sri Lanka, the prime minister said almost all issues in the island nation have now been resolved.

He congratulated the Indian Army for the successful operation in Maldives recently.

**Paper Comments on Pakistan's Missile Tests**

*BK1202100089 Delhi THE HINDUSTAN TIMES  
in English 7 Feb 89 p 13*

[Editorial: "Pakistan's Missiles"]

[Text] Pakistan's declaration with a flourish that it has test-fired rockets for what should eventually make it a missiles power seems more designed to divert the focus of India's concern from Islamabad's capacity to make a nuclear bomb to its imminent mastery of a lethal delivery system.

It is not without significance that the announcer was the Pakistan Army chief, Gen. Mirza Aslam Beg, and the occasion was his address to the National Defence College at Rawalpindi before a crowd of military students from Bangladesh, Malaysia, Indonesia, Jordan and Turkey doing a war course.

Since Pakistan claims that it is not pursuing a nuclear weapons programme, it should follow that its space research is geared to no military objectives.

The proud announcement of the test-firing of missiles should have ordinarily come from the Pakistan Prime Minister, or someone on the civilian side of Pakistan's political structure, as an instance of outstanding scientific achievement. But, then, the intended military significance and the message of the event would have been lost.

Why should one assume that the missile story was a calculated move made at a particular point of time? The answer should be available in the recent news reports virtually confirming Western acquiescence in Pakistan's endeavour in the nuclear and thermo-nuclear fields, and in the projected view that the US Administration may no longer find it easy to certify Pakistan's non-weapons programme for continued American economic and military aid.

The danger to uninterrupted US support might also have partly arisen because of Senator Stephen Solarz's strong views about the nuclear pursuits in South Asia. Gen. Beg might have felt compelled to tell the Senator that the latter would not be allowed to jeopardise the benign and indulgent attitude the US has traditionally adopted towards Pakistan.

The new emphasis on missiles might serve another purpose. Washington apparently is getting reconciled to its inability to prevent Pakistan from having nuclear bombs in the basement. Its attempt to thrust upon India and Pakistan the concept of mutual abstinence of nuclear weapons has proved futile.

The objective to get New Delhi around to it might be a step closer were a missiles race between India and Pakistan to become a reality.

Pakistan's lack of depth in land mass makes a missiles parity with India of far greater significance than possessing just a nuclear arsenal. Given the West's dislike of the development of rocketry and space technology in South Asia, an Indo-Pak missiles parity might become a tempting aim to achieve for Washington.

Since the possession of a long-range missile in the hands of Islamabad poses far greater security risks for New Delhi than a bomb, India might find the concept of a

missiles parity difficult to accept. Pakistan's launching its missiles has only one message for New Delhi: It should stop dilly-dallying on its own missiles programme.

**Pakistani Nuclear Program Harms 'Goodwill'**  
*BK0802115589 Delhi General Overseas Service  
in English 1010 GMT 8 Feb 89*

[Commentary by S.C. Bhatt: "The Bomb Again"]

[Text] India has voiced her concern once again over the nuclear weapons program of her neighbor. This was done by the prime minister, Mr Rajiv Gandhi, himself a few days ago while speaking to his Congress-I party men in Bombay. The theme was India's relations with the neighbors and Mr Gandhi rightly chose the occasion to refer to reliable reports which pointed to the advance in the bomb project, which Pakistan has pursued relentlessly.

The reports are mainly of two kinds. The acquisition of tritium by Pakistan as before by clandestine means and the test firing of missiles claimed and confirmed by Pakistan's official media. Tritium, as Mr Gandhi pointed out, boosts the yields of bomb 4 or 5 times and has hardly any other application. Missile testing seems to be going on pace in Pakistan.

First, it was claimed that a rocket, which can go deep into space as far out as 650 km, had been tested. Then the Pakistan Army chief, General Mirza Aslam Beg, announced that his country has successfully test fired a long range missile with a range of 300 km.

In addition, another missile with a range of 80 km had also been tested. General Mirza spoke 2 days after Prime Minister Rajiv Gandhi had expressed this country's concern over the tritium and missile development affair in Pakistan.

The Pakistan Army chief's proud announcement did not quell with the statement by his country's Foreign Office that Islamabad was surprised at Mr Rajiv Gandhi's remarks. What was so surprising about them? That tritium has found its way from West Germany to Pakistan had been reported by the European media. The reports about Norway's missiles had come from Pakistan.

If you just put two and two together, you get the kind of reaction which the prime minister gave vent to in Bombay. In fact, the flow of information from American media generally friendly to Pakistan—because Islamabad is an American ally—has been consistently pointing to Islamabad soon becoming the owner of the bomb.

A serious debate is in progress in the United States whether the Bush administration would any longer be in a position to prevaricate as the predecessor had done about Pakistan's nuclear weapons program. The massive

military and economic aid program for Pakistan may be in jeopardy if the U.S. President does not certify that Pakistan's nuclear program is a peaceful one.

How can anyone in India ignore all these signals? On top of these reports come yet another account in a leading American weekly, *NEWSWEEK*. This one said that Pakistan is now in a position to make four nuclear bombs.

Quoting American intelligence estimates, the prestigious weekly said: Pakistan has the capacity to put enriched uranium into shape and has many substitute casings and fusing devices for the bomb. Madam Benazir Bhutto, the Pakistan prime minister, has sought to underplay reactions to her country's march toward the bomb.

Mr Gandhi in a speech in Bombay had praised the nuclear policy of the Pakistan People's Party which Madam Bhutto leads. On both sides, therefore, the clear effort is to maintain and strengthen the climate that was generated when Mr Gandhi visited Islamabad for the annual summit of the South Asian Association for Regional Cooperation, SAARC. That was just before the New Year and the two prime ministers had cordial talks and an agreement not to attack each others countries' nuclear facilities was also signed.

It is in the interest of both countries to shore up and build on this promising beginning in normalization of relations which had remained strained for a long time.

Hope has been kindled on both the sides of Indo-Pakistan border that with the return of democracy in Pakistan and the rise to power of Madam Bhutto, the past of unhappy relations can be buried forever. This hope could, however, become a reality only if there is strong and determined effort to foster the forces which shall bury this past and put tendency which could resurrect it. [sentence as heard]

The nuclear weapons program of Pakistan falls in the second category. It can worsely destroy the fabric of trust and goodwill that the Islamabad talks between Mr Rajiv Gandhi and Madam Bhutto have helped to create.

Security for nation is of uppermost concern. Pakistan's relentless march toward the bomb cannot but cause the deepest concern in this country. Only reliable evidence on whether the bomb project has been called off after Madam Bhutto assumed the reins office as prime minister can allay Indian fear.

#### Gandhi Expresses Concern Over Pakistani Missile

BK0802125189 Delhi Domestic Service in English  
1230 GMT 8 Feb 89

[Excerpt] The prime minister has said India is worried about the testing of a surface-to-surface missile by Pakistan, as it is capable of carrying a nuclear weapon. In an

interview to the Australian Broadcasting Corporation, Mr. Rajiv Gandhi said the recent disclosure about Pakistan's nuclear program is also worrying, but it is very difficult to say whether Islamabad already has a nuclear weapon. He expressed the hope that the United States will put pressure on Pakistan and prevent it from making nuclear bombs.

Mr Gandhi said the people of India and Pakistan want friendly relations and hoped that the coming to power of Ms Benazir Bhutto will help bring this about. [passage omitted]

#### Antinuclear Activist Worked for Janata Government

51500060 Bombay *THE TIMES OF INDIA* in English  
5 Dec 88 p 10

[Article by Bachi J. Karkaria]

[Text] His voice has the cadences of a quiet discourser on Hindu philosophy rather than the strident tones of an activist.

He wears what might be described as a khadi safari suit—if such a sartorial oxymoron was permissible—rather than the regulation denims of protest. But this is not really surprising considering that though Dhirendra Sharma may be better known for his seminal work in challenging the nuclear establishment and the politics and the decision-making on the nuclear question in India, he also happens to belong to a family that speaks Sanskrit at home and he read philosophy at the University of London to write a thesis titled *The Paradox of Negative Judgement*, with special reference to Indian Logic.

Perhaps it is this combination that makes him the dialectician of the antinuclear movement in India (never mind that he has, among other invective, also been branded a "CIA agent"). He clarifies that his objection is only to nuclear power and weapons. He finds the use of nuclear medicine indispensable as also the use of atomic sciences in agriculture. "I am skeptical of irradiation of foodstuff, but certainly the application of nuclear physics to bioengineering or the evolution of seeds is far-reaching without the danger of serious side-effects or unmanageable waste."

Dr Sharma is Professor of Science Policy at JNU, and is currently in Bombay to, among other things, seek an audience with the atomic energy papacy.

His current academic exercise centers on the production of the first booklet in Hindi outlining all the nuclear issues. His earlier book, "India's Nuclear Estate", was the first critical academic study on the subject, and perhaps the first to rip off the veil of illusion and cozy half-truth that had projected the science as the answer to all of India's needs.

He argues that India's plunge into these still virtually untestable waters was prompted by the "transit stage to nationhood" in which most third world countries still find themselves. "It's a way of showing that we are as good as the rest. 'If the West can have it, so can we'."

His quarrel has been with the mystique that surrounds the nuclear establishment, abetted by the Atomic Energy Act of 1962. "The Department of Atomic Energy is not telling the truth to the Prime Minister, that young lotos-eater. It has actually propagated the lie that thermal power stations produce as much radioactivity, when the real truth is our old friend, vested interest. The DAE does not want any interference in the vast and secret funds that have always been placed at its disposal. To date, Parliament has never discussed the unaccountable crores that have been spent."

Apart from his background where, as a student in England, he participated in the Bertrand Russell-blessed Aldermaston march and was present at Caxton Hall where Russell read out the manifesto of the Einstein-initiated Pugwash movement that was the first international scientific group to question the scientific paradise specifically on nuclear matters, Prof Sharma has something of an insider's knowledge since the Janata Government had assigned him a special project to assess the whole atomic energy programme thus giving him rare access. (During the Emergency he had been stripped of his chairmanship of the Centre for Studies in Science Policy at JNU.)

He scoffs at the "control" exercised by the Atomic Energy Regulation Board: "How can it sit in judgement over its boss; it is simply a unit under the DAE which even sanctions its finances. Its importance can be gauged from the fact that the DAE's latest annual report dismisses its activities in two pages and refers to only three visits paid during the year to atomic units. There are some 25 of them."

The latest focus of his activism—target would be too violent a word for this intensely ahimsic man—is the Narora nuclear power plant. He was the first to warn of the frightening combination of alluvial soil without a rock base, the earthquake-proneness and the proximity of a water source no less consequential than the Ganga itself; that there was a design defect; that there is no arrangement for the disposal of the thousands of tons of nuclear waste it will produce—waste that remains potent for 25,000 years.

He insists that the project should be abandoned even if Rs 800 crores and 15 years have been expended on it. He points to the precedent in New York State which did not allow the commissioning of the \$5.3 billion nuclear reactor built in 1984.

He offers a safer blueprint that would salvage a large part of the Narora costs. "There is a gas pipeline close by and plenty of sunshine. With some modification the plant can be made to use gas and solar energy instead of nuclear fuel to produce power."

Is there an alternative to atomic energy when Mr M.R. Srinivasan, chairman of the AEC never tires of pointing out the limited supply of fossil fuels, when the establishment in France has hailed atomic energy as the only means of stalling the greenhouse effect? Dr Sharma answers, "Leave our nonrenewable energy resources alone. Why not use the 11 lakh MW hydel potential; what about the boundless and bountiful sunshine? Let us explore, not exploit."

"How can we compare industrial pollution to the still largely unknown dangers of radioactivity? Asks Prof Sharma. "The genetic impact is both recessive and irreversible. Our medical experience is still very low; the third and fourth generation after Hiroshima is still to be born. Besides, low level radiation continues to seep out even without an accident. There is not even a record kept of the wives and children of workers in our atomic power plants. Have we no moral responsibility for posterity?"

**New IAEA Safeguards Agreement Contrary to Indian Policy**  
51500059 Bombay *THE TIMES OF INDIA* in English  
7, 8 Dec 88

[Article by G. Balachandran]

[7 Dec 88 p 12]

[Text] In anticipation of the finalization of the India-USSR intergovernmental agreement on the supply of two 1000 MWE nuclear power units by the USSR, India concluded recently an agreement with the IAEA for implementation of safeguards in respect of these nuclear power stations. According to Mr K. R. Narayanan, the minister of state in the department of atomic energy, the safeguards agreement, signed on September 27, 1988, was broadly similar to those in respect of the Tarapur atomic power station and the Rajasthan atomic power station. According to the minister, the safeguards agreement *inter alia* provides for IAEA safeguards for all nuclear fuel used in the reactors supplied by the USSR. The reactors will be under IAEA safeguards till the IAEA, India and the USSR jointly determine that the reactor in question is no longer usable for nuclear activity relevant from the point of view of safeguards. In addition, it provides that safeguards on spent fuel will terminate in case it is transferred to the Soviet Union.

#### Reply Differs

A study of the agreement in question reveals that the reply given by the minister differs sharply from the provisions of the agreement. The safeguards applied by IAEA are far more stringent than any accepted by India

so far. They require safeguards on: i) The reactor facilities supplied by the Soviet Union to India under the agreement, and the reactor facilities produced therefrom or as a result of their utilization; ii) Any nuclear material supplied by the Soviet Union to India for use of the reactor facilities; iii) Any nuclear material, including subsequent generations of special material, produced, processed or used in or by the use of the reactor facilities or in or by the use of any other items referred to in this section; iv) Any other item required to be listed in the inventory referred to in section 6.

The main part of the inventory listed in section 6 of the safeguards agreement is more or less a reiteration of the above. The subsidiary part of the inventory also listed in section 6, includes "any nuclear facility while containing, using, processing or fabricating any nuclear material referred to in the main part of the inventory."

The list is broadly similar to the list outlined in the safeguards agreement in connection with the supply of heavy water from the Soviet Union, except for the underlined item in (i) above and another section of the safeguards agreement, section 5, which states, "in the event that India should construct or operate reactor facilities, as defined in section 1(d), it shall arrange to submit such reactor facilities to agency safeguards before such construction or operations commences."

These two taken together require that India should place under similar safeguards all reactors, based on the Soviet design, constructed in future in India, irrespective of whether these were constructed with foreign help or by indigenous efforts as a result of the experience gained with the use of the currently supplied Soviet reactors. Thus India has, in effect, agreed to perpetuity and to pursuit clauses not only in respect of the Soviet supplied reactors but also in respect of all reactors of the same design that might be built in India.

For comparison, if a similar clause had been part of the safeguards agreement in respect of the Rajasthan atomic power station, we would have had to put under safeguards not only RAPS but, in addition, the Madras atomic power station, the Narora atomic power station and all the Candu-type atomic power plants that are being constructed or planned in India. Few would deny that such an agreement would have been a setback to Indian efforts towards self-reliance in the nuclear field. Yet in response to a question whether the latest safeguards agreement is a setback to our goals of self-reliance, the minister replied in the negative.

There can be no doubt that the current safeguards agreement is a far more restrictive one than any India has agreed to so far. In fact, if a similar agreement had been entered into by India in respect of the other power reactors, TAPS and MAPS, then for all practical purposes India would have been under full-scope safeguards. It is true that the reprocessing plants and the heavy water plants would not be under safeguards. But

since by virtue of the safeguards agreement all power reactors would have been covered by the perpetuity and pursuit clauses, all the nuclear material used, produced or processed in these reactors including subsequent generations of special fissionable material would have been under safeguards and we would have had to put the future generations of breeder reactors under safeguards as well.

#### Spent Material

In fact, the implication of the minister's statement that the Tarapur and Rajasthan atomic power station safeguards agreements were broadly similar is itself a misleading one. The RAPS agreement was a far more restrictive one than in the case of TAPS. As a matter of fact, there has been a steady deterioration, from the Indian point of view, in the terms of the safeguards agreements, four in all including the latest one, that India had concluded with the IAEA.

The first safeguards agreement was signed in January 1971 and was in respect of the Tarapur atomic power station. The agreement with the U.S. regarding TAPS was a special one, since the nuclear fuel for TAPS was supposed to be supplied exclusively by the U.S. The safeguards were applied on the reactors at TAPS; any nuclear material, equipment or device transferred to India by the U.S.; any special material produced in India in, or by use of, materials or equipment or devices transferred to India; and any facility while it is containing, using, fabricating, or processing, any special nuclear material transferred to the government of India for, or special material produced at the Tarapur atomic power station.

In practice, this meant that in addition to TAPS, fuel elements and the spent fuel, the nuclear fuel complex and the Tarapur reprocessing facility were under safeguards while they contained material to be used or used in TAPS. The agreement did not cover the second and successive generations of nuclear material obtained by the use of the spent material. In any case, it was expected that the spent fuel would be returned to the U.S. The safeguards agreement thus included the perpetuity clause but not the pursuit clause.

In agreeing to even such a limited safeguards agreement the Indian government stated explicitly that, "the government of India emphasizes, in contrast to the position of the United States, that its agreement to the provisions of this article in relation to equipment or devices transferred pursuant to this agreement has been accorded in consideration of the fact that, as provided in this agreement, the Tarapur atomic power station will be operated on no other special nuclear material than that furnished by the government of the United States and special nuclear material produced therefrom in consequence of which the provisions of this article in relation to equipment or devices in any case ensure from the safeguards on fuel".

In spite of such explicitly stated provisions, India found it difficult to break away from the agreement when the U.S. refused to supply fuel to TAPS. Eventually, of course, the agreement was transferred in favor of France which continues to supply fuel to TAPS and the safeguards agreement remains in place.

Soon after the first agreement, India signed a second safeguards agreement with the IAEA in September 1971, which was in connection with the Rajasthan atomic power station. This agreement was somewhat similar to the TAPS agreement. The safeguards were to be applied on all nuclear material used or produced in RAPS. In addition to the nuclear material, the heavy water supplied by Canada was also under safeguards for a period of five years only, since upon the completion of the 5-year period, such heavy water was supposed to be removed from the scope of the agreement by retransfer from India to Canada or by substitution in accordance with established procedures.

#### Pursuit Clause

In addition to this, the safeguards agreement stipulated that "nuclear material produced by the use during the aforesaid 5-year period of such heavy water, and all subsequent generations of nuclear material produced in or by the use of such material, shall be subject to the implementation by the agency of the safeguards provisions". Here we have the first application of the pursuit clause. However, in this instance it was limited to only a 5-year period during which the heavy water supplied by Canada was to be used in RAPS.

After that period, if India had used domestically produced heavy water in RAPS, the safeguards were to be applicable on only the spent fuel produced in RAPS but not on the subsequent generations of special fissionable material produced by the use of this spent fuel. More specifically, if India has used the plutonium extracted from the spent fuel to fuel its breeder reactors, only the amount of plutonium used originally would have been under safeguards and not the excess of plutonium produced in the breeder. So in the second agreement there was a perpetuity clause and a limited period pursuit clause. A slight retreat from the first agreement, but still acceptable.

[8 Dec 88 p 12]

The Pokhran explosion altered the situation dramatically. With the withdrawal of Canada from the project and with the domestic production of heavy water far behind schedule, India had to look for other sources of heavy water.

Finally a third safeguards agreement, second with respect to RAPS, was signed with IAEA when the Soviet Union agreed to supply India with the required heavy water. This agreement went far beyond the first two. The safeguards were to apply to: heavy water supplied by the Soviet Union to India; any nuclear material, including

subsequent generations of special fissionable material, produced, processed or used by the use of the heavy water supplied by the Soviet Union, or of any other nuclear material under safeguards; any nuclear material, including subsequent generations of special fissionable material, produced, processed or used in the Rajasthan atomic power station or by the use of any other facility under safeguards; any facility while containing, using or processing any of the heavy water or any nuclear material under safeguards.

Thus perpetuity and pursuit clauses were applied to RAPS reactors, the heavy water supplied by the Soviet Union and all nuclear material used, produced or processed in or by the use of any item under safeguards. The scope of this agreement was far beyond anything even considered in the first two. Fortunately, the agreement was restricted specifically to RAPS and the heavy water supplied by the Soviet Union. Thus, when India built and commissioned with indigenous efforts the Madras atomic power station, it was not covered under any safeguards agreement. The significance of this achievement should not be underestimated.

#### N-Safeguards

There are currently five nonnuclear weapons states that have unsafeguarded facilities of significance for safeguards (Brazil, India, Israel, Pakistan and South Africa). Of these, only India has so far managed to build and operate nuclear power stations without outside help and thus outside safeguards. In the remaining countries all their nuclear power stations, either operating or under construction, are under safeguards. And the Indian nuclear power programme did not envisage any further safeguards on any future nuclear power stations, at least till now.

With the latest agreement, India has committed itself to subjecting, not one nuclear power station, but a whole class of nuclear power stations to safeguards. No amount of indigenous efforts can help us in breaking this stranglehold of safeguards. Now it is true that the wording of the agreement leaves some scope for manoeuvre in future, but that can still lead to disputes and arbitration, a course of action full of uncertainty and pitfalls. The costs involved in the current course of action far outweigh any benefit that we can get. The benefit is 2000 MWE. The costs are politically far more. The current agreement falls just one step short of full-scope safeguards, something which we have been opposing consistently so far.

In the international arena this question of full-scope safeguards has been a bone of contention between the nuclear weapon countries along with a number of developed countries and few developing countries, especially Brazil and India. Some 137 countries have signed the NPT which, in effect, calls for full-scope safeguards. Among the nonnuclear states that have not signed the NPT, eight have significant, operational or planned, nuclear activities in their countries. These are Argentina, Brazil, Chile, Cuba, India, Israel, Pakistan and South

Africa. In five of these states unsafeguarded facilities of significance for safeguards are either in operation or under construction. Among these five, only India has a serious civilian nuclear programme calling for substantial investment in nuclear power generation.

Internationally the efforts of the IAEA have been directed towards either bringing these unsafeguarded facilities in these nonnuclear states under safeguards or restricting the growth of such unsafeguarded facilities. Towards the latter end, the IAEA has been continuously strengthening its safeguards conditions. In the earlier years its efforts were directed towards applying safeguards on specific installations or nuclear supplies. Later they began to apply the safeguards on installations and nuclear material.

The Tarapur and the first Rajasthan agreements belong to these types of safeguards. The safeguards scope was then expanded to include pursuit clauses in its totality. The second Rajasthan agreement is an example of this kind. Still the efforts were directed towards specific installations. In the early eighties it began to adopt a different strategy. With the example of India, which had begun to build a series of nuclear power stations on its own but based on an imported design in mind, the IAEA began to insist on safeguards being applied on a whole series of built, under construction or under possible construction, nuclear facilities.

#### Spain's Treaty

When, in April, 1981, Spain signed an agreement with IAEA in respect of the Vandellós nuclear power plant, the safeguards agreement called for safeguards on only the Vandellós facility along with safeguards on all nuclear material used or produced by the use of Vandellós facility, including subsequent generations of such material. However, when a couple of months later, in July, 1981, Argentina approached IAEA for a safeguards agreement in respect of the Atucha nuclear power plant, IAEA insisted on applying safeguards not only on Atucha but on "any nuclear facility designed, constructed or operated in Argentina on the basis of or by the use of the technological information transferred from the Federal Republic of Germany to Argentina contained in design drawings, technical specifications, technical manuals for the operation and maintenance of the Atucha plant".

With this stipulation, the IAEA prevented Argentina from following India's example of building similar reactors on its own and keeping them free from safeguards. The strategy was clearly to prevent the country from expanding its inventory of unsafeguarded facilities, the underlying idea being that, if you cannot get a country to either sign the NPT or accept full-scope safeguards, expand the safeguards conditions so that with a single agreement a large number of facilities can be brought under safeguards. In case of Atucha the terminology was specific. In the present agreement that India has signed,

the IAEA has used more general terms. It is interesting to speculate whether this would result in a wider coverage than the Atucha or a narrower one.

In any case what is important is the fact that there is a fundamental conflict between the aims and objectives of the IAEA and India. The IAEA's aim is to get as many Indian nuclear facilities as possible under its safeguards coverage, thereby circumventing India's objections to either signing the NPT or accepting full-scope safeguards. India's aim is to develop its indigenous nuclear capabilities with as little international safeguards, as exemplified by the NPT, as possible. The present agreement is a clear victory for the IAEA. What is not clear is why the Indian government and nuclear establishment agreed to concede such vital principles to the IAEA.

#### Science Congress Discusses Nuclear Plant Safety

51500058 Madras *THE HINDU* in English  
11 Jan 89 p 9

[Text] Madurai, Jan 10—"In the rare event of an earthquake, the safest place in the area would be a nuclear plant" said Prof A.R. Chandrasekaran, University of Roorkee, here today.

Prof Chandrasekaran was delivering a lecture on "Earthquake engineering aspects of nuclear power plant building and equipment" at the symposium on "aseismic design of dams and nuclear reactors" under the auspices of the section on engineering sciences of the 76th session of the Indian Science Congress.

The earlier doubts expressed by the Chairman, Syndicate Committee of the Science Congress, to the press on the topic being discussed at the congress due to lack of confirmation from the speakers proved untrue with the arrival of the experts concerned yesterday.

From earthquake consideration, Prof Chandrasekaran said, that there is a lot of conservatism in all aspects of design of structure and equipment in the current practice of nuclear power plants (NPPs). "For an earthquake engineer handling a variety of structures and systems, the practice in NPPs appears to be an over-kill, with conservatism at every stage," he said. He pointed to the recent event of the Yerevan earthquake in Armenia where the nuclear reactors remained totally unaffected.

**Aseismic design:** The papers presented at the symposium dwelt on the analytic approach and elaborate methodology adopted for the aseismic design of various NPP structures, systems and components in the country. The importance of this symposium stems from the fact that such detailed presentations would help to dispel the adverse public fear and criticism on siting of NPPs at Narora and Kakrapar, from the seismic point of view. According to Dr S. K. Chatterjee, Director (Engineering) Nuclear Power Corporation, Narora Atomic Power

Plant (NAPP), two 235 MW(e) pressurized heavy water reactors (PHWRs), is now scheduled to be commissioned around February 10, 1989.

For seismic design of NPPs, two levels of seismic parameters are prescribed for an NPP site, Dr Chatterjee explained in his keynote address. These are the safe shutdown earthquake (SSE) and the operating basis earthquake (OBE). The SSE corresponds to that vibratory ground motion for which the various structures, systems and subsystems required for safety are designed to remain functional. This according to Dr Chatterjee, is an extreme design requirement related to the safety of the structures, the failure of which can release radioactivity to the environment.

**Narora plant site:** The double containment of the reactor structure, in addition, provides for the radioactive release to be less than one-tenth of permissible levels, even for the upper limit of the earthquake magnitude set for the site. The magnitude limit set for Narora is 7.0 on the Richter scale which is 0.5 more than the largest earthquake experienced in the region of 12-30 km from the site. This corresponds to about 10 times more energy release than the maximum in the geological history of the site region. For other NPP sites, the values are somewhat lower.

The OBE, on the other hand, relates to that vibratory ground motion for which structures, systems and components necessary for power generation are designed to remain operational.

The assessment of design basis earthquake for an NPP site is based on the detailed geological and seismological investigation covering an area within a radius of 300 km around the site. The design earthquake is arrived on the basis of certain guidelines prescribed by the International Atomic Energy Agency (IAEA) based on active fault and earthquake potential assessed for the fault.

Most of the time, there is lack of data to assess the activity of the fault and its potential, Dr Chatterjee said. Hence, according to him, the practice has been to assess the SSE on a very conservative basis, having decided the earthquake design parameter in terms of magnitude, epicentral distance and depth of focus. This is translated into response spectra and acceleration information for the aseismic design.

The OBE is decided on the basis of the earthquake most likely to occur during the operating life of the plant. In the absence of a detailed probabilistic evaluation, it is usually taken as one half the SSE level which, Dr Chatterjee said, leads to a conservative assessment of the OBE design requirement.

For NPP which lies in a moderate seismic zone (between III and IV) under a five zone classification, with the most severe being Zone V, the aseismic design parameters have been evaluated on the basis of investigations carried out by the Roorkee University scientists. Elaborate seismic

instrumentation has already been installed at Narora. Dr Chatterjee pointed out that the recent Bihar and Nepal earthquakes were not at all felt at the Narora site.

**Stringent criteria:** There is a minimum seismic level to which an NPP has to be designed even if it falls in an area of very low seismicity. The U.S. Nuclear Regulatory Commission prescribes a minimum value of 0.10g for which an NPP needs to be designed. But NPP designers, Prof Chandrasekaran pointed out, have always adopted much more stringent criteria.

According to the Indian Code IS:1893, a three storied building at Narora (Zone IV) should be designed for 0.05g, whereas the value adopted for NPP is 0.70g, that is 14 times the normal civilian construction limit, Prof Chandrasekaran pointed out. If the design earthquake adopted for NPPs are to be used to check other structures in that area, including dams, generally they would fall, if not showing lot of distress", he said.

According to him, the material used in the construction of NPPs in the form of reinforced concrete, prestressed concrete, mild steel, special steel, etc. are considered best for earthquake resistance as they are ductile and has a large energy absorbing capacity. To visualize the type of failure seen during actual earthquakes on building and other structures is improbable in the case of NPPs, Prof Chandrasekaran said.

**Equipment behavior:** As regards equipment behavior during earthquakes, Prof Chandrasekaran pointed out that it is not desirable to have equipment resting freely. They need to be anchored at the base. The concept design for the NAPP fuelling machine, for example, was changed in view of this.

For seismic qualification of equipment, Prof Chandrasekaran said if a prototype can be tested experimentally, that method is always preferred. Otherwise, the qualification is done analytically. For Indian NPPs, testing of small size electrical and electronic items, a shake table available at the ECIL, Hyderabad, is used. The department at Roorkee has recently acquired a large two dimensional computer controlled shake table, capable of testing 20-tonne systems.

#### Editorial Urges Caution in Development of Atomic Energy

S1004704 Calcutta ANANDA BAZAR PATRIKA  
in Bengali 15 Jan 89 p 10

[Editorial: "Atomic Energy and a Security Shield"]

[Text] From the very first day human beings mastered the science of smashing atoms to generate energy, arguments about the future of this energy and its inherent problems began. The same argument still remains in many countries of the world. Recently, in Calcutta, the head of the Nuclear Energy Commission pointed his arrows straight at the center of that argument. He stated

that irrespective of the opinions expressed by others, India must use nuclear energy widely. Otherwise India's progress will be hampered. The statement, "irrespective of the opinions expressed by others" indicates his inclination to express his opinion unilaterally. Of course, that should not surprise anyone, because the person who made that statement is the leader of the Nuclear Energy Commission, and naturally it is not expected of him to speak out against this energy under any circumstances. In other words, he is one of the supporters of nuclear energy, a member of the nuclear "lobby." However, his statements also indicated that the argument has not yet come to an end. As a matter of fact, not far from the platform he was using to express his opinion, expressions of a different view were being broadcast. Through slogans and staging of sit-ins others were voicing the warning that we do not want nuclear death.

India's effort to become empowered with nuclear power is not new. As a part of this country's overall economic development, the policy of splitting atoms as a source of generating electricity, was adopted a long time ago. Since then, research in the practical application of nuclear energy has made considerable progress. Foreign collaboration is still needed, but dependence on others has been reduced significantly. At the conclusion of the first phase of generating electricity out of nuclear energy, India is now planning to increase that capability significantly. Steps are being taken to establish nuclear power plants in various sections of the country. Such a positive attitude toward nuclear power is not without reason. Mankind has long depended upon thermal electricity generated out of coal. However, the supply of coal is limited, and India's supply is rapidly dwindling. Though hydro-electricity is better than others, its supply is uncertain and irregular. The research to generate electricity out of nonconventional sources, such as from ocean currents, solar rays or fossils may generate lots of possibilities. However, presently they are still possibilities only. Electricity has been generated out of all these sources, but these sources' economic viability has not yet been established. Consequently, the importance of nuclear energy as the alternative for generating electricity cannot be denied. Developed countries realized its importance a long time ago. They have made plans accordingly, and utilized it effectively. Countries like India, which have started their race for development at a later time, have the added advantage of learning from the experiences of their predecessors in applying technology. The application of nuclear technology is one example of this advantage.

However, at the same time, countries like India have to remain alert so that they do not commit the same mistakes as their predecessors. Inherent dangers and problems of nuclear technology are closely related. Just as the possibilities of nuclear technology is unlimited, its inherent danger is also enormous. Unless there are plenty of safety features built in it, any nuclear generation plant can transform itself into a formidable killing machine. Developed countries have an unlimited amount of money to spend to clean up their atomic

wastes. As a matter of fact, they can even arrange to have other countries take their atomic wastes. Only a few days ago, one shipload of chemically enriched trash was floating around searching for a dumping ground. For a country like India purification and "exporting" of waste products is financially prohibitive. It cannot wait to be said that India should not spread around waste as other countries have illegally and immorally done. Consequently, only after all manner of precaution is exercised, should India make the sacrifices necessary to develop atomic electricity. Courage and daring are not the same thing. One of the requirements of being astute is to know the difference between the two, and act accordingly.

**Madras Atomic Station Unit Synchronized**  
BA0902093689 *Delhi Domestic Service in English*  
0830 GMT 9 Feb 89

[Text] The first unit of the Madras Atomic Power Station at Kalpakkam was synchronized this morning. The unit was shut down for annual maintenance in December.

## ISRAEL

**'Advanced' Missile Base Reported in Golan Heights**

JN3101164089 *Abu Dhabi AL-ITTIHAD in Arabic*  
30 Jan 89 p 1

[Text] AL-ITTIHAD has learned that the Israeli enemy army last week established a base for advanced missiles in the occupied Syrian Golan Heights.

Palestinian and Western sources in London have revealed to AL-ITTIHAD that the aforementioned base involves a long-range missile system and is only 3 km away from the Syrian city of Al-Qunaytirah. They added that this type of missile can reach remote areas.

## PAKISTAN

**Editorial Urges Bold Policy on Nuclear Issue**  
BA1502074989 *Lahore JANG in Urdu* 17 Jan 89 p 3

[Editorial: "How Long Will the Apologetic Attitude Toward the Nuclear Program Continue?"]

[Text] Talking to the visiting U.S. delegation led by Stephen Solarz, President Ghulam Ishaq Khan said that Pakistan will set up its own nuclear power plants within the next 10 years. The president said Pakistan badly needs nuclear technology to meet its rapidly increasing energy requirements. He asserted that Pakistan has no plans whatsoever to manufacture nuclear weapons, and the world should trust the word of a democratic government.

Referring to U.S. apprehensions on nuclear proliferation in South Asia, the president said this issue cannot be resolved by resorting to a discriminatory policy. The United States should formulate a regional strategy to deal with the issue.

Viewed from various perspectives, President Ishaq Khan's statement on Pakistan's nuclear program has special significance. The president's remarks that Pakistan will start setting up its own nuclear power plants, God willing, within the next 10 years is particularly encouraging for the patriotic, self-respecting, and confident Pakistani citizen. The self-confidence reflected in the president's announcement will boost the determination and confidence of the entire nation. Moreover, the president has fulfilled his responsibility as the nation's spokesman by saying that Pakistan will never accept a policy based on discrimination in relation to its nuclear program.

However, there is another aspect of the issue which causes us great concern: What difficulty are we facing as a nation that forces us always to provide explanations to all and sundry about our nuclear program? Our nuclear program always becomes a topic of discussion whenever any foreign personality visits our country or our leaders go abroad. And in every case, our leaders make timid statements or adopt an apologetic position on this issue. No such explanations have been heard about India's nuclear program so far, nor have Indian leaders been observed to explain their position on the nuclear issue merely to satisfy others.

The fact is that India's progress in nuclear technology and its nuclear intentions are evident to the whole world. India has already carried out a nuclear test. No power of the world can approach the Indian nuclear installations. India is not ready to sign either an international or a regional nuclear nonproliferation treaty. Furthermore, it has rejected out of hand the proposal for making the whole of South Asia and the Indian Ocean a nuclear-free zone. But no one dares point a finger at her nuclear policy. And what we are doing? We start offering explanations about our nuclear program, even to someone who is overflying our territory?

What we have derived from our extremely apologetic and weak nuclear policy is that we failed to do anything so far to overcome the energy problem by developing nuclear technology, despite being maligned by the whole world. Not only has the process of reconstruction and progress been halted, but we have been forced to lag behind in other sectors as well. It is obvious to anyone that all this is the result of our extremely apologetic position regarding our nuclear program.

When we look at the other side, we see India, a sovereign and confident nation, that does not allow anyone to pass comment on its nuclear program. As a result, it is not only making rapid progress in this field on its own, but the United States, the Soviet Union, and many other countries having access to nuclear technology have been forced to cooperate with her.

Who does not know the attitude of Solarz toward Pakistan and its interests? He is considered the most active supporter of the Indian and Zionist lobbies in the United States. He is also called the Senator from India. What is

more interesting is that he spends much more energy trying to hurt Pakistani interests than he does in actively working for the protection of India's interests. Mr Solarz has always been in the forefront of attempts to stop U.S. military and economic assistance to Pakistan, not to mention Pakistan's nuclear program.

But what we are doing? We are opening the book of our explanations on the nuclear issue to the same Mr Solarz. It is true that we are a peace-loving nation and we do not foster any desire to either manufacture nuclear weapons nor to acquire them from any other source. But the question remains: Why do we have to repeat the same explanation over again to the world? Why can we not continue to implement our programs according to our wishes as other independent and sovereign nations are doing?

#### Reaction to Solarz Remarks on Nuclear Issue

##### Government Response

BK030202989 Islamabad Domestic Service in Urdu  
0200 GMT 3 Feb 89

[Text] A Foreign Office spokesman in Islamabad yesterday reaffirmed the peaceful nature of Pakistan's nuclear program and said Islamabad is ready to consider all positive proposals that are fair, nondiscriminatory, and not prejudicial to Pakistan's sovereignty. He was commenting on the remarks of U.S. Congressman Stephen Solarz, who reportedly mentioned a proposal under which the United States would sell an atomic reactor for peaceful nuclear energy to Pakistan. As a quid pro quo, Pakistan would agree to accept total safeguards for all of its nuclear installations, including the existing ones.

The spokesman said this is not the position. Pakistan needs atomic reactors to meet its energy requirements, and it is on record that these reactors will come under the safeguards of the International Atomic Energy Agency.

The spokesman pointed out that the IAEA [International Atomic Energy Authority] safeguards are also being applied to the Karachi nuclear power plant, but the question of signing the Nuclear Nonproliferation Treaty, accepting total safeguards, or agreeing to the inspection or verification of Pakistan's nuclear installations is a different issue. Pakistan will not accept any discrimination in this regard. The cause of nuclear nonproliferation in the region can be carried forward only through non-discriminatory and equitable measures. With this background, Pakistan had suggested that the nuclear issue be solved on a regional basis, and it had already forwarded several proposals for this purpose.

##### Comments by THE MUSLIM

BK3101105589 Islamabad THE MUSLIM in English  
18 Jan 89 p 4

[Editorial: "Welcome Assurance"]

[Text] President Ghulam Ishaq Khan has done well to emphasise the peaceful nature of Pakistan's nuclear programme before the visiting United States Congressional delegation. This was necessary as there was much

misinformed criticism about the country's nuclear plans and its capability in this advanced technology.

The leader of the team of Congressmen, Mr Stephen Solarz particularly, represents a powerful lobby in the American legislature which is unduly concerned with Pakistan's nuclear intentions, frequently alleging that this country was clandestinely producing atomic weapons. In fact, one of the issues the delegation was interested in taking up with Islamabad was the nuclear question. The President's assurance that Pakistan was not interested in building or acquiring nuclear weapons should help in clearing away all unnecessary doubts in the United States about our intentions.

The problem with some sections of the American leadership is that it has consistently refused to believe that the nuclear programme in many Third World countries is designed entirely for economic uses. With their own government having been the international leader in developing nuclear weapons of mass destruction—overtly and covertly—they are inclined to suspect every country striving to meet its energy bills through atomic power as harbouring similar ambitions.

This has resulted in creating a strong lobby in America that encourages the use of its political and economic clout to selectively prevent some of the countries from pursuing their own nuclear plans. Thus, while Israel and South Africa are allowed to develop nuclear weapons without any hindrance, countries like Pakistan are repeatedly singled out for strong pressure from Washington over the nuclear question.

Whether the United States or any other Western power likes it or not, Third World countries like Pakistan that are increasingly unable to satisfy the heavy energy demand because of a paucity of funds will have to develop their nuclear infrastructure to meet the economic challenge in the future. The existing or future conventional sources of energy like hydroelectricity and fossil fuels are not likely to bridge the gap between demand and supply of energy in the 21st century, which is just a decade away.

The exploitation of both these sources of energy require massive investment and a lengthy gestation period for implementation of projects, which Pakistan will find increasingly difficult to meet. On the other hand, nuclear energy is much more cost effective and less time consuming in creating an infrastructure for it. The President's disclosure that Pakistan would be able to build nuclear power plants on its own in about 10 years provides the answer to the technological difficulty of developing the nuclear program.

Thus Pakistan, like a host of other states similarly placed in strained economic circumstances, is poised to enter the next century with a heavy reliance on nuclear power. A shortage of funds and time has obfuscated all other options, and atomic energy remained the only answer.

Much of the planning in the early 1970's was designed to create the necessary wherewithal for shifting to nuclear power in the future. The new government will have to resume the plan and expedite the progress of development so that by the year 2000 we will not be handicapped by the difficulties we face today because of a massive shortfall in power production.

This is a fact the United States and other concerned nations must learn to accept, and, instead of unnecessarily creating obstructions in the path of Third World countries trying to meet the challenge of the future, they should extend all the help and cooperation possible.

#### Army Chief Announces Surface-to-Surface Missile Tests

##### Successful Launch Reported

*BR0502114589 Islamabad Domestic Service in English  
1100 GMT 5 Feb 89*

[Text] Pakistan has successfully fired and tested indigenously manufactured surface-to-surface long-range missiles and will also be able to roll out the first homemade tanks within 2 years' time. This was stated by the chief of the Army staff, General Mirza Aslam Beg, while addressing a joint session of the participants of the national defense and Armed Forces [words indistinct] at the National Defense College in Rawalpindi today. Giving details of achieving this landmark in indigenous arms production, the chief of the Army staff said that two types of surface-to-surface missiles—one having a range of 80 km and the other 300 km—were tested recently.

##### Further on Beg Comments

*BR0502132189 Hong Kong AFP in English  
1245 GMT 5 Feb 89*

[Text] Islamabad, Feb 5 (AFP)—Pakistan has successfully fired and tested indigenously manufactured surface-to-surface long-range missiles, Army Chief General Mirza Aslam Beg said Sunday.

Addressing officers at the National Defence College in Rawalpindi, General Beg also disclosed that Pakistan would be able to roll out its first tanks within two years, the official Associated Press of Pakistan (APP) reported.

He did not say when the missiles were fired, but press reports said they were tested last month.

Gen Beg said Pakistan recently tested two types of missiles, with ranges of 80 kilometers and 300 kilometers respectively.

The missiles and their guidance systems were developed locally, Gen Beg added.

"These are extremely accurate systems and are capable to carry a payload of 500 kilograms," he told military students from Bangladesh, Indonesia, Malaysia and Turkey, the APP said.

The Army chief said Pakistan's new tanks would "be capable of defeating any known armour in the world."

The Army chief also said Pakistan has achieved 90 percent self-sufficiency in all calibres of ammunition.

His statements follow accusations from Pakistan's traditional rival, India, that the new missiles could be intended to carry nuclear warheads.

Indian Prime Minister Rajiv Gandhi said Friday that India would take steps to ensure that its security was not threatened.

The two neighbours, which have fought three wars in the past 40 years, are suspicious of each other's nuclear programmes, although both claim to oppose acquisition of nuclear arms.

Gen Beg said: "This indigenisation is part of the process of building a strong deterrent capability so that the country was not made a victim of aggression."

#### More on Missile Tests

BK0302162489 Islamabad Domestic Service in English  
1600 GMT 5 Feb 89

[Text] Pakistan has successfully test-fired two types of indigenously manufactured surface-to-surface long-range missiles and will also be able to roll out the first homemade tank within 2 years. This was stated by the chief of the army staff, General Mirza Aslam Beg, while addressing a joint session of participants at the national defense and Armed Forces war courses at the National Defense College in Rawalpindi today. The missiles—one having a range of 80 km and the other 300 km—are extremely accurate arms and carry a payload of 500 kg. The chief of the Army staff said the homemade tank to be ready within the next 2 years would be capable of defeating any known armor in the world today.

#### Bhutto Congratulates Nation on Missile Tests

BK0602164089 Islamabad Domestic Service in English  
1600 GMT 6 Feb 89

[Text] The prime minister, Ms Benazir Bhutto, has congratulated the nation for entering into the missile age by the successful firing of ground-to-ground missiles. In a message to the nation the prime minister said by launching these missiles the dream of Prime Minister Shaheed [martyr] Zulfikar Ali Bhutto has come true.

#### Spokesman Raps Gandhi Remarks on Nuclear Program

BK0502033289 Islamabad Domestic Service in Urdu  
0200 GMT 5 Feb 89

[Text] A Foreign Office spokesman expressed surprise and concern at the statement made by Indian Prime Minister Rajiv Gandhi in Bombay in which he said that West Germany has provided Pakistan with atomic technology and tritium, which can be used to increase the power of atomic bombs from four to 10 times. Expressing concern at the text and the context of the statement, the spokesman said that both countries had made a good beginning toward normalizing relations after the meeting of their prime ministers. As a result of these talks, an accord was signed on not attacking each other's nuclear installations. This is definitely a step in the right direction.

The spokesman reiterated that Pakistan did not import any atomic material or technology of this sort from the Federal Republic of Germany. The German authorities have themselves said that they have not exported any plant to Pakistan to split tritium. However, there are press reports that India has acquired a large quantity of heavy water produced in Norway through clandestine sources. Similarly, press reports from the Federal Republic of Germany have indicated that India has imported 95 kg of fully enriched (Caribbean) metal, which can be used to manufacture 20 hydrogen bombs. Despite deep concern over India's atomic intentions, the spokesman did comment on these press reports. The spokesman expressed hope that the Indian leadership will desist from making efforts to create doubts and suspicions about Pakistan's nuclear program, which is meant only for peaceful purposes.

#### Ambassador Denies Nuclear Help From PR

OW1002040589 Tokyo KYODO in English  
0309 GMT 10 Feb 89

[Text] Beijing, Feb. 10 KYODO—Pakistan Ambassador to China Akram Zaki denied media reports Thursday that Pakistan is developing nuclear weapons with help from China.

He said Pakistan is against the diffusion of nuclear weapons and the nuclear agreement concluded with China in 1986 is limited to peaceful uses.

Pakistani Prime Minister Benazir Bhutto and Indian Prime Minister Rajiv Gandhi have said the development of nuclear power by Pakistan and India is aimed at solving a shortage of energy resources, a problem in both countries.

The two countries agreed not to use nuclear force against each other in the future, Zaki said.

## Nuclear Waste Disposal Issues Debated

### Storage Policy Criticized

18220040z Moscow LITERATURNAYA GAZETA  
in Russian No 2, 11 Jan 89 p 9

[Letter to the Editor by Boris Kurkin, USSR MVD Academy docent, candidate of juridical sciences: "So Where Do We Store Nuclear Waste?" For a translation of the Semenov interview in LITERATURNAYA GAZETA 28 December 1988 see FBIS DAILY REPORT: SOVIET UNION, FBIS-SOV-89-001, 3 January 1989]

[Text] In LITERATURNAYA GAZETA of 28 December 1988 we published a conversation with deputy chairman for the state committee for atomic energy utilization [GKAE] B. A. Semenov regarding the burial of spent nuclear fuel in the USSR ("Where Nuclear Waste Goes"). Responses to that conversation have begun to reach the editorship. We publish one of the letters:

B. A. Semenov's answers elicit a number of new questions. Let us begin with Comrade Semenov's assertion that the information regarding the agreement in preparation for the burial of radioactive waste (RAO) from the FRG in the USSR "does not correspond to reality."

However, ARGUMENTY I FAKTY (No 35, 1988) published academician N. Ponomarev-Stepnoy's statement on the type of creation compatible with the FRG's firms' new high-temperature reactor with helium cooling (VTGR). The academician noted that in this case, the Soviet side will take upon itself the supply of Soviet nuclear fuel in the FRG and return the spent fuel for processing and burial.

The contract on the construction of the VTGR reactor had already been signed, as the general director of the International Atomic Energy Agency (IAEA) Kh. Bliks reported in the pages of PRAVDA (18 November 1988).

Thus, if the contract was concluded under the conditions which N. Ponomarev-Stepnoy discussed in ARGUMENTY I FAKTY, it means that radioactive wastes from AES (atomic energy stations) in the FRG will begin to come to the USSR.

It is necessary that GKAE publish the text of all effective agreements with the FRG and other countries. The public must know that international cooperation is taking place between the USSR and foreign countries in the area of nuclear energy; all secret departmental diplomacy is inadmissible by considerations of public safety.

And yes, you will agree that the contract's conditions are highly unusual. Imagine that we were selling apples while obligating ourselves to take back the cores.

As Kh. Bliks emphasized in PRAVDA, "all nuclear fuel which the USSR sells to other countries will be collected by it after its utilization at the AES." It remains to be asked of B. A. Semenov, "to what other countries are we selling nuclear fuel?" The question also arises, if nuclear energy in the world and in CEMA develops in the future, then will our country actually take on the role of the world's reservoir of radioactive wastes?

It must be noted that B. A. Semenov is careful to hide where in the territory of the USSR the means for re-energizing spent nuclear fuel and its burial place are (by the way, they do not make a secret of this in the West). It is known that fuel which is unregenerated and unburied is an enormous radioactive danger. In light of this, it should be known which soviets of people's deputies would have agreed to the fact of the construction of these reservoirs? This is an important thing to know, since the country's political system is undergoing perestroika, and the soviets are the organs responsible for the regions' ecological condition and the expression of the interests of the populations whom they represent.

And now, directly relating to the problem of storage and burial of radioactive waste. None of the specialists knows where and how to store RAO (RAO with a high specific activity is under discussion). P. L. Kapitsa, N. A. Dollezhai, Yu. I. Koryakin, V. A. Legasov, L. A. Ilin and many others have written on the undecided nature of this problem. And B. A. Semenov spoke in his interview only of "advanced technology" of enclosing RAO in high-melting glass.

Alas, there are no appropriate industrial technologies for spent fuel, but we are already accepting the waste of foreign nations (a reminder that the nuclear energy capabilities of the member-nations of CEMA and Finland, from which we already accept RAO, is equal to about 30 percent of the nuclear energy capabilities of the USSR).

It should be kept in mind that projects built by human hands have a life span of thousands of years, while RAO formed during a nuclear reaction has a life span numbered in millions of years. Therefore, "leakage" of RAO to the "exterior" at any burial site (even a highly reliable one) is unavoidable. Also unforeseen is the behavior of geological formations in which the burial of RAO will take place. Essentially, this is death in temporary storage.

For this very reason, the West German specialists consider unacceptable the RAO burials in seams of rock salt in Gorleben (there is nowhere else to store them), and that is why, perhaps, burial abroad is the FRG's only way out of the situation.

Incidentally, B. A. Semenov's optimism with regard to methods of glass encasement of highly radioactive RAO should be noted. However, it cannot be forgotten that in his evaluation of the Chernobyl RBMK reactor (LITERATURNAYA GAZETA 11 June 1986), B. A. Semenov

radiated no less optimism, saying that "the specialists had no problem (with the reactor)." However, as is apparent from the publication of S.N. Ushanov, "Disagreement is Needed" (LITERATURNAYA GAZETA 20 July 1988), extremely serious construction defects were detected under experimentation at least 10 years ago.

But the issue is not only the realistic control of the activities of atomic departments in matters of RAO storage and burial. It is important to provide for their safe transportation. The distances from AES's of the socialist, let alone the western countries to the storage sites must be thousands of kilometers, with the transport routes lying in heavily populated regions. Knowing how frequently accidents occur, the question arises: how and by what means can we guarantee the safe transportation of RAO?

As we see, questions and more questions...

#### Official Denies Problems

18220040z Moscow LITERATURNAYA GAZETA  
in Russian No 7, 15 Feb 89 p 9

[Letter to the Editor by B. A. Semenov, first deputy chairman of the USSR State Committee for Atomic Energy Use: "The Departments Concerned Don't Have to be Taught"]

[Text] Dear Editorial Board!

I want to respond right away to Comrade B. Kurkin's letter (LITERATURNAYA GAZETA No 2, 1989) about the issues raised by your correspondent in a conversation with me (LITERATURNAYA GAZETA No 52, 1988), following sequentially the basic questions raised in it.

Although Comrade Kurkin for some reason casts doubt on my words, I am once again forced to assert that the information regarding the agreement supposedly in preparation about the burial in the USSR of radioactive waste (RAO) from the FRG does not correspond to reality.

The general agreement, which has already been signed, contains no mention of RAO.

For my own part, I would add that if the firms of the FRG (or another country) were to agree to purchase our uranium and our services for its enrichment, and in addition, paid us well for accepting our fuel (not RAO) back, then such a composite deal would be completely justified from the point of view of economics (this system of services, for a single 1,000 Mvt reactor would yield about one billion dollars over 30 years), and of non-proliferation of nuclear weapons, as the remaining uranium (about 95 percent) and the plutonium formed would be returned to the Soviet Union.

Citing once again the PRAVDA interview with H. Blix, who mentioned that all the nuclear fuel which the USSR sells other countries is collected by it after use by an AES, the author concludes that "it remains to be asked of B. A. Semenov to what other countries are we selling nuclear fuel?"

Why ask, when I had already answered that question in a conversation with LITERATURNAYA GAZETA 28 December? We do not sell our nuclear fuel (with the exception of a number of small shipments to research and development reactors previously sold by us) to any countries other than those indicated in the answer (countries of CEMA and Finland), and we don't sell it without taking back the returned fuel.

Later, the fear is expressed that as nuclear energy is developed, our country will then take upon itself the role of the world's RAO reservoir. I want to say that such fears are connected to poor information and conjecture in the field of the cycle of nuclear fuel in the world market, where today our share (on the Western market, excluding Finland), in storage and processing of fuel is zero, and in enrichment services rendered, about four percent.

Later, I am accused of carefully hiding "where, in the territory of the USSR, the means for re-energizing spent nuclear fuel and its burial place are." In my response to an analogous question from your correspondents I explained that we have still not yet reprocessed nuclear fuel on an industrial level, and its corresponding burial of wastes, therefore, the majority of spent fuel (heat releasing elements) is preserved in cooling ponds—reservoirs.

I also mentioned that we have waste reprocessing technology and, naturally, reprocessing for the fuel itself. I might add that we also have a successfully operating industrial pilot plant at which this technology was developed. I did not name the location of the site where wastes are sometimes stored temporarily for the reason that it is located on the territory of a defense project. I hardly think that anyone would insist on announcing the location of such projects, although our attitude toward that sort of information is constantly changing. Incidentally, this site was selected in a difficult period, in the late 40's, when the enormously important task of eliminating the U.S. monopoly on nuclear weapons in a short period loomed before us. I think that this will answer the question, "which of the soviets of people's deputies would have agreed to the fact of these reservoirs' construction."

Comrade Kurkin questions my assertion that reliable technology exists for the processing and burial of radioactive wastes, fretting that, nevertheless, we already accept such waste.

The last assertion simply does not correspond to reality. We do not collect the waste of fuel reprocessing (we accept spent fuel elements), and their storage does not present major problems, and is done all over the world.

And finally, the assertion that "none of the specialists knows where and how to store RAO." In response, I cite the statements of IAEA general director H. Blix on this subject. They are from the same interview quoted by Comrade Kurkin.

In response to the question of RAO burial, H. Blix states: "I am convinced that there is a difference of principle in the assessment of the seriousness of this problem: on the one hand, as we say, by the man on the street, and on the other hand, by the expert, the scientist, who is extremely familiar with the problem. The average person thinks that the problem has not been solved and it is hard to say whether it will be solved in the future. The experts who study this problem know that at present there exist no scientific-technical barriers on the path to resolving this problem. There are different technologies, including a technology already developed for disposal of even highly radioactive wastes."

Obviously, Comrade Kurkin must figure out which category he belongs to: "the man on the street" or the "experts."

In connection with this, I would like to note the scientific level of this specialist on all matters of nuclear energy and its fuel cycle, as vividly demonstrated in his article, "Death in Temporary Storage," and the article on the

problems of nuclear wastes in the newspaper MOS-KOVSKIY KOMSOMOLETS No 259, 10 November 1988, as well as some incredibly complex publications in the journals ZNANIYE-SILA, YUNOST and a number of others. The uninitiated reader may get the impression that the author is cleverly manipulating the complex nuclear terminology, broadly quoting Soviet and foreign sources. The specialist is amazed by the author's self-assuredness, risking going into print with smashing pseudo-scientific articles which clearly demonstrate, to put it mildly, his low competence in a field about which he evidently reads a great deal, understanding far from everything, despite taking it upon himself to shame and teach the specialists and "departments concerned."

I would note that Comrade Kurkin belongs to a group of, I would say, un-constructive critics of atomic energy, whose only goal is to accuse, to cast doubt on anything and everything connected with the development of atomic energy, proposing nothing in its place (except for a program of energy conservation, which, while important, naturally does not solve the problems of meeting the country's energy demands), and not examining the well of problems associated with the use of alternative energy sources.

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*From the Editors: Our mail contains many letters concerning the country's development of nuclear energy in general and storage of RAO in particular. This pointed and worrisome issue concerns practically everyone. We at LITERATURNAYA GAZETA have decided to accept Comrade Semenov's suggestion on conducting a "roundtable" on these issues, with the participation of scientists, specialists, writers and—via correspondence—readers.*

## FEDERAL REPUBLIC OF GERMANY

### Firm Said To Export Missile Components to Libya

LD3001190389 Hamburg DPA in German  
1749 GMT 30 Jan 89

[Text] Karlsruhe (DPA)—Highly valuable missile components have been transported to Libya, according to a report in the BADISCHE NEUESTE NACHRICHTEN (BNN) via a firm in northern Baden. As the newspaper, which is published in Karlsruhe (Tuesday edition) [31 January] reports, quoting Gustav Eduard Michaelis, the president of the Karlsruhe Finance Office, this illegal export was discovered last year by customs investigators. An investigation was started on the possible violation of the law on the control of weapons of war.

Out of concern for the inquiries, which were still in progress, the Karlsruhe Higher Financial Directorate refused to give further details on the extent of the arms dealing. The name of the firm was also not given. This is not the only occurrence of transportation of weapons to Libya through northern Baden, the paper quotes Michaelis as saying.

### Further on Possible Export of Missile Parts to Libya

LD3101172989 Hamburg DPA in German  
1619 GMT 31 Jan 89

[Text] Munich (DPA)—The Munich I Public Prosecutor's Office has started further preliminary investigations into a Bavarian capital-based enterprise's possible export of illegal weapons to Libya. The Globesat Co. for Applied Satellite Technology Ltd, according to Managing Director of Public Prosecutions Heinz Stocker, is suspected of violating the weapons control law and the foreign trade law. No statement was available from the company today.

According to Stocker, the firm is said to have delivered for some years electronic steering units "and then a whole string of testing and measuring systems" to Libya. The director of public prosecutions said that these technical appliances had been used or were to be used for the construction of missiles. The Karlsruhe Higher Financial Directorate had conducted relevant investigations and had now transferred the case to Munich.

The authorities in Baden-Wuerttemberg sent 29 files with approximately 4,000 pages to the Public Prosecutor's Office in Munich, under whose direction proceedings on possible weapons exports are also being conducted against five firms based in and around Munich, Stocker outlined. The papers from Karlsruhe have not yet been analyzed, and nothing is known about possible results. "There may or may not be something," said Stocker.

The customs Investigation Department of the Karlsruhe Higher Financial Directorate confirmed that investigations are being made "in long pending proceedings on the export of missile components." The BADISCHE NEUESTE NACHRICHTEN had reported that high-grade missile components had been transported to Libya via a firm in North Baden. Here the newspaper referred to the president of the Finance Directorate.

### Pakistani Embassy Linked to Nuclear Transactions

LD2601164889 Hamburg DPA in German  
1503 GMT 26 Jan 89

[Text] Bonn (DPA)—The Pakistani Embassy in Bonn was involved in nuclear transactions of the New Technology Co. (NTG) in Gelnhausen, Hesse, under its former ambassador; the state prosecutor's office in Hanau is carrying out an investigation of the former NTG manager on suspicion of illegal nuclear exports. This emerges from a report made today by public prosecutor Reinhard Huebner to the private meeting of the Bonn nuclear investigating committee, which is dealing with the matter.

SPD deputy Bernd Reuter added that mail destined for the NTG was apparently carried by diplomatic bag and delivered personally by an embassy courier. The firm is accused of delivering components for a tritium collection-and-purification plant to Pakistan without permission. The components for the complete plant were assembled in Pakistan, according to the findings of the investigation. The NTG made its deliveries via the small firm Physikalisch-Technische Beratung (PTB) of Ortenberg, Hesse, so as not to draw attention to itself.

Huebner, referring to the question of why Pakistan needed the plant, said, "We ask ourselves that everyday." Reuter said experts are trying to clarify the question of whether there was a military purpose. Investigations are being carried out against the NTG and PTB, mainly for violations of the Foreign Trade and Payments Law, and possibly also of the War Weapons Control Law. Nine persons are now under investigation.

The illegally delivered plant is a project worth up to DM 2.5 million. The delivery of components took place over a period of months. According to the findings of the state prosecutor's office, 0.8 grams of tritium reached Pakistan. They were reportedly delivered by a Swiss firm via the firm Gutekunst in Baden-Wuerttemberg, with a stop-off in Hong Kong. The cost of DM 100,000 was more than the market price.

The delivery to Pakistan by NTG of so-called cladded pipes used for processing fuel elements also took place by a devious route, according to the latest findings. The SPD deputy reported that a state that has signed the Nuclear Nonproliferation Treaty was named by the French manufacturer as the receiving country.

**Export of Beryllium to India Approved in 1984**  
*LD2801184289 Hamburg DPA in German*  
*1645 GMT 28 Jan 89*

[Excerpts] According to the news magazine DER SPIEGEL, the federal government in 1984 approved the export to India of the metal beryllium, which can be used to make nuclear weapons. The Bonn Economic Ministry and the Foreign Office (both FDP-led) on 15 March 1984 signed a form permitting the Hanau firm Degussa to export 85 kilograms of beryllium to India, DER SPIEGEL reported. The delivery was made to the Bhabha Atomic Research Center (BARC) in Trombay, north of Bombay. Beryllium is subject to strict mandatory approval. It is on the Bonn list of exports, which is supposed to prevent the export to problem countries of nuclear material that can be used to make weapons, the magazine states. [passage omitted]

As DER SPIEGEL continues, the application documents available to the magazine suggest that a large proportion of the material originates in the United States. Degussa had acted as an intermediary dealer. India has not signed the Nuclear Nonproliferation Treaty. [passage omitted]

**Companies Exported Beryllium to India**  
*AU3101095489 Hamburg DER SPIEGEL in German*  
*30 Jan 89 pp 22-23*

[Unattributed article: "Convenient Size"]

[Excerpts] Bonn authorities permitted the export of beryllium to nuclear-weapons-possessing India in 1984. Beryllium is used for constructing bombs. [passage omitted]

According to subparagraph 0112 of Bonn's "export list B," which is intended to prevent exports of nuclear goods that can be used for the production of weapons to problematic countries, the export of beryllium is classified as strictly requiring an export license. However, as is coming to the surface now, the Hanau-based Degussa company is suspected of having exported in the spring of 1984 95 kg to India, of all countries, a country that has nuclear weapons—and Bonn had "no objections."

The deal, which was authorized by the authorities of the then Economic Minister Otto Graf Lambsdorff (FDP) and Foreign Minister Hans-Dietrich Genscher, might become the cause of new irritations in FRG-U.S. relations. As can be learned from the application papers, which DER SPIEGEL has, the bulk of the material came from the United States, as middleman, Degussa passed the hot goods on to India.

The transaction took place at a time when, internationally, the rumor was growing stronger that, after its atomic bomb, India was about to develop its own hydrogen bomb. The delivery was forwarded to an address,

which, according to FRG nuclear researcher Gerhard Locke, is "most suspicious": the Bhabha Atomic Research Centre (BARC) in Trombay, north of Bombay.

This center likes to boast about its nuclear developments in the fields of medicine and agriculture. However, the Indians are less ready to supply information concerning the military part of their research.

International safeguard controlling agencies have no access to information regarding the amount of plutonium—the stuff of which the bomb is made—the nuclear reactors in Trombay breeds. What is certain is that the material for India's first nuclear explosion in 1974 was provided by Trombay. U.S. experts estimate its present plutonium production at some 25 kg per year.

What is strange is that, by consenting to the Degussa deal on 15 May 1984 with a specific form, the ministries in Bonn discarded any "suspicion of abuse of beryllium for nuclear purposes." Last week, Degussa itself, parts of the shares of which are held by a subsidiary of the Henkel Washing Powder Co. and Dresdner Bank, did not find anything objectionable to the deal with India. According to company spokesman Joachim Niemtz, the delivery "was carried out with the permission of the authorities."

On 21 October 1983 the Federal Economic Office (BAW) accepted the first of two applications for exports by the Hanau enterprise. Only 4 months previously, in June 1983, the Reagan administration had stopped all U.S. deliveries of this kind to India—at that time secret intelligence services noticed intensive efforts by India to start a second nuclear test, possibly with a hydrogen bomb.

Similar reports were spread by the Federal Intelligence Service (BND) almost 2 years later. The "BARC Nuclear Research Center in Trombay," the BND warned in a classified report of May 1985, has been ordered by the Indian Defense Ministry to "continue work on developing a nuclear fusion weapon (hydrogen bomb)."

In its application for exports, Degussa put under the heading "use" "research and development work" in smelting, compressing, and casting of beryllium, which is often used for alloys. Material of "high purity"—at least 98 percent—had been ordered. Degussa added a telex of the Indian Nuclear Ministry [title as published] to the documents for the application. In this telex a government representative claimed that India does "not have any program for the production of nuclear weapons."

According to experts, the amount of beryllium ordered at that time makes sense: 95 kg—this is "a manageable amount for about 20 bombs," arms researcher Locke says.

In building a hydrogen bomb, the metal can be put around the radioactive core as a sheath. The desired effect: According to Locke, the neutron-multiplying properties of the relatively cheap beryllium reduce the demand for valuable plutonium "by a factor of about 2."

The Bonn experts cannot have ignored this possibility of use. Experts of the FRG Research Ministry expressly warned against the fact that the metal can "be used as a neutron reflector for the construction of nuclear weapons," when they had to deal with an application for the export of 60 kg of beryllium nitrate to India in February 1980.

The permit was issued at that time only because, according to BAW calculations, a maximum of 2.637 kg of pure beryllium could be produced from the nitrate.

The Research Ministry experts noted that for the building of bombs India needs "amounts ranging in kilograms." These were delivered 4 years later—almost 100 kg.

**Degussa Confirms 1984 Sale of Beryllium to India**  
LD0102181489 Hamburg DPA in German  
1644 GMT 1 Feb 89

[Text] Frankfurt (DPA)—The Frankfurt metal and chemicals firm Degussa Ltd confirmed that in 1984 it sold about 95 kg of beryllium of U.S. origin to the Indian state atomic authority. "This material originated from U.S. imports," according to a Degussa Ltd statement issued today in Frankfurt.

The German authorities had issued an export permit at the firm's behest. "With hindsight, a U.S. export license might also have been necessary." Degussa is taking this matter "very seriously and is currently checking out the entire matter with U.S. legal advisers."

The U.S. Department of Commerce and the German authorities were today informed that in 1984 the Hanau branch sold 95 kg of beryllium to the Indian state atomic authority.

**Economics Ministry on Resale of Beryllium to India**

**Ministry Comment Reported**

LD0102180489 Hamburg DPA in German  
1638 GMT 1 Feb 89

[Text] Bonn (DPA)—In the opinion of the Federal Economics Ministry, the resale of U.S. beryllium to India is not a matter for the federal government, but a matter between the Frankfurt metal and chemicals firm Degussa Ltd and the U.S. Government. In issuing an export permit, it is irrelevant whether there was a reexport permit, Ministry spokesman Dieter Vogel said today. In the direct sale of beryllium to India, Degussa

had added to the export application the Indian Government's confirmation that the beryllium was to be used for nonmilitary purposes. The officials at the responsible department had no reason to distrust the confirmation.

**Bonn Confirms Exports**

AU0202112889 Frankfurt/Main FRANKFURTER  
ALLGEMEINE in German 2 Feb 89 p 3

[Article by K. B.: "Bonn Confirms Beryllium Exports to India"]

[Text] Bonn—When questioned, the federal government confirmed on Wednesday [1 February] that the metal beryllium has been exported by the Degussa company to India, and beryllium nitrate by the Darmstadt-based Merck Co. The Economics Ministry, the Foreign Ministry, and the Research Ministry agreed to authorize this in 1984. As India had promised to use the imported quantities for civilian and not for military purposes, the consent was given. There was no reason to distrust or contradict the Indian data, it is stated. Referring to hints in U.S. reports that the beryllium came from the United States and that the Degussa company was not permitted to pass it on without a reexport license, the Economics Ministry spokesman said that it had not been possible to examine this when the Federal Economic Office in Eschborn had authorized the exports. This question concerns relations between the Degussa company and U.S. authorities.

**Secret Government Plan To Limit Illegal Exports**  
AU3101122789 Hamburg WELT AM SONNTAG  
in German 29 Jan 89 pp 1-2

[Article by Herbert Kremp and Heinz Villain: "Secret Plan—Bonn Intends To Confiscate Profits From Illegal Exports"]

[Text] Bonn/Munich—The federal government intends to increase drastically the punishment for illegal nuclear and chemical exports and to create legal conditions allowing it to confiscate any profits from such deals in the future.

This follows from a secret study that experts from seven concerned ministries prepared by the federal chancellor's special order. The paper has become known to WELT AM SONNTAG.

According to the study, in the case of violations of the Foreign Trade and Payments Law, the maximum punishment will be increased from 3 to 5 years, while the fine will be doubled from DM500,000 to DM1 million. The Bundestag will be informed about the relevant amendment to the law on 15 February.

In addition, Federal Chancellor Kohl will ensure by a "solidarity action of the Western industrial nations" that Libya does not receive the missing building elements and materials for the production of poison gas. As WELT

AM SONNTAG has learned from the Chancellor's Office, in talks with the Allies Kohl is trying to bring about a corresponding common initiative soon.

In recent reports, Western intelligence services, including the Federal Intelligence Service (BND), agree that no poison gas can at present be produced at the controversial Al-Rabitah Libyan chemical plant because it is not technically complete.

The leading associations of German industry—BDI [National Federation of German Industries], DIHT [German Industry and Trade Association], and BDA [National Union of German Employer Associations]—have appealed to all companies to show "maximum sensitivity and care" regarding export orders that could serve the production of chemical weapons.

Doubts and contradictions regarding the time at which government authorities in Bonn were informed about the involvement of German firms in the Libyan chemical deal were expressed once again at the 26th meeting of defense experts in Munich on Saturday (28 January).

In response to strong reproaches by U.S. Senator John S. McCain to the federal government, notably Foreign Minister Genscher, Defense Minister Scholz said that the federal chancellor, Genscher, and he learned about the German involvement in Libya for the first time during their visit to Washington in November 1988. "That was absolutely new, it was a shock," Scholz said.

However, on 13 January, government spokesman Ost had said that, since August 1987, the BND had reported on the building of a suspicious chemical plant in Al-Rabitah near Tripoli. On 18 January, Minister in the Chancellor's Office Schaeuble said that, since October 1987, the BND had reported on a certain German involvement in the building of the chemical plant. The reports were sent to "all central offices of the federal government."

At the Munich defense experts meeting, Senator McCain began his statement by reminding the Western countries to do everything to prevent the proliferation of bacteriological and chemical weapons. He said that "one of the highest German officials" had been informed about the involvement of German firms in Libya. However, Genscher had denied knowing anything about it, he said. "Did the data that existed for a long time not reach the foreign minister?" the senator asked.

Scholz rejected the "questions expressing doubts" about Genscher and said that they are not fair. He said that, after the German visitors had been informed by Secretary of State Shultz and CIA Director Webster at their hotel in Washington in November last year, the federal government immediately initiated all measures—both legislative and juridical—to prevent the proliferation of dangerous technologies and substances.

SPL defense expert Egon Bahr also had earlier defended Genscher against the reproach of having denied that he knew. Bahr said that he was convinced that Genscher learned about the suspicion for the first time in Washington.

#### EC Approves Controlled Nuclear Fusion Research Program

3698M026z Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 486, 29 Aug 88 pp 12-13

[Text] The EC Council of Ministers has approved a research and training program in the field of controlled nuclear fusion and intends to make ECU735 million available from 1 January 1988 to 31 March 1992. The following individual research and training objectives are to be pursued:

##### 1. The main aims of the program are:

- To establish a physical and technological base for detailed planning of NET [Next European Torus]; in the field of physics and plasma technology, this includes fully exploiting JET [Joint European Torus] and various medium-sized specialized tokamaks already existing or under construction, while in the field of technology, it includes expanding current fusion technology programs;
- To begin detailed construction design for NET before the end of the program's lifetime, although not before the next program revision, when the necessary data base will be available;
- To investigate the reactor potential of some alternative construction types.

The program consists of:

- a) Plasma physics in the nuclear fusion field, especially basic research in plasma confinement, using the appropriate equipment, and in methods for creating and heating plasmas;
- b) Research work on the confinement of hydrogen, deuterium, and tritium plasmas in closed configurations for broad ranges of thickness and temperature;
- c) Research on the interaction of light, material, and transport phenomena, as well as research on the development of high-performance lasers;
- d) Developing effective plasma heating methods and applying them in confinement facilities;
- e) Improving measuring methods;
- f) Preliminary design of the next stage and, if possible by the next amendment to the program, the beginning of detailed construction design—which should profit from the work done on conceptual designs for NET

and also ITER [International Thermonuclear Experimental Reactor]; in addition, technological research on the planning and construction of the next-stage fusion reactor, as well as the necessary long-term developmental research.

- g) Expanding the JET facility to full capacity, running and using JET;
- h) Studying the feasibility of fusion, including environmental tolerance, safety, and economic viability.

The work cited above under the letters a), b), c), d), e), f), and h) is to be carried out in the framework of partnerships or time-limited contracts. All future research at the Joint Research Center in the field of NET and fusion technology is to be taken into consideration.

The realization of the JET project cited under letter g) was the responsibility of the JET joint enterprise set up by Euratom Resolution 78/471.

2. The program described under No 1 is one of long-term cooperation that includes all the activities of the member states in the field of controlled magnetic fusion. In time, it should lead to the joint preparation of prototypes for mass production and marketing.

3. The sum of ECU406 million, considered necessary to carry out the program (excluding JET), includes the financing of:

- a) Priority projects—about 45 percent of the cost of the work described under No 4;
- b) Current expenses of the partnerships—about 25 percent of the cost;
- c) Certain industrial contracts in the field of NET fusion technology and the development of advanced plasma heating methods—100 percent (see No 4);
- d) Administrative costs and expenses to ensure mobility of personnel carrying out the program as well as the NET team, and to finance a special stipend system in conjunction with the fusion program;
- e) Operational costs of the NET team—up to 75 percent;
- f) An evaluation of the program by independent experts as well as an evaluation of the environmental, security, and economic aspects of fusion;
- g) According to a hearing of the fusion program advisory committee: cost-sharing contracts with groups in member states not involved in partnerships for special research expenses—about 25 percent of current expenses and about 45 percent of research-specific capital expenditure.

Each contribution from third-party countries (Sweden and Switzerland) to the program, excluding JET, shall be applied to the expenses mentioned above for the financial benefit of the EC.

4. According to a hearing of the fusion program advisory committee—see No 3—the Commission may finance projects in the following fields for a total participation rate of about 45 percent:

- a) The Tokamak system and financing for JET;
- b) Other toroid installations;
- c) Heating and injection;
- d) NET and fusion technology.

If these projects belong to categories c) and d) and are carried out by industry, the Commission can finance them up to 100 percent—see No 3 c).

All partnerships have the right to participate in the experiments carried out with the facilities and equipment set up for this activity.

5. The total contributions of the members of the JET joint project for JET expenses during the time the program is running are estimated at ECU440 million. They should cover the expansion of the JET facility to full capacity, as well as its operational costs. In accordance with the JET charter, 80 percent of this sum, i.e., ECU352 million, will be financed by the EC budget.

This sum is estimated to be financed as follows:

- ECU329 million from the means available for the JET program;
- ECU23 million for the participation of Sweden and Switzerland in JET via the EC budget.

#### Scholz Denies Development of New Air Attack Missile

AU0702104889 Cologne Deutschlandfunk Network in German 1000 GMT 7 Feb 89

[Text] The Defense Ministry has denied reports that the Bundeswehr is developing an air attack missile with a range of less than 500 km that is also able to carry nuclear warheads. Franz Alt, the chief of the ARD report program, said in Baden-Baden this morning that his department has obtained documents from the ministry, which according to FRG and U.S. arms experts show that this is the case. The order to develop this arms system, which is called (COLAT), is based on a 1983 directive given by the chancellor to develop a successor system for the Pershing-1a.

The spokesman for the Defense Ministry, Dunkel, merely confirmed that there is a technology and experimental program by which Hardthoehe [FRG Defense Ministry] has tried to discover whether conventional missiles with a range of less than 500 km are technically possible. In doing so, the basic idea is to test conventional weapons which would render enemy airports inoperative during the initial phase of a conflict. Dunkel expressly ruled out the nuclear use of such missiles. He stressed that for this purpose, special technical prerequisites, which the Germans do not yet know, have to be met. Such developments are being carried out by the governments of those countries which have nuclear weapons, as their responsibility.

**Lafontaine Criticizes Bonn's Missile Plan**  
*AU1302111389 East Berlin NEUES DEUTSCHLAND in German 11-12 Feb p 1*

[Text] Bonn (ADN)—Oskar Lafontaine, Saarland minister president and SPD deputy chairman, has criticized the FRG Government's plan to build a "short-range missile that can possibly also be equipped with nuclear warheads" as incredible. Lafontaine said that Bonn is now even trying to sell the suspension of the project as a contribution toward disarmament.

Walter Kolbow, deputy chairman of the Bundestag Defense Committee, said on the same subject that those who are serious about mutual security and the conversion of armaments into defensive structures do not need any offensive missiles. Temporarily freezing the KOLAS [Complementary Air Attack System] missile project must be assessed as an attempt to stop public discussion of plans to step up armament. However, the issue must remain on the agenda, he said, and the objective must remain a third zero solution for Europe. The disarmament process which has been initiated by the INF Treaty must be continued, and the threat posed by nuclear and conventional short-range missiles must be eliminated, he said.

## FINLAND

**Licenses for Loviisa Nuclear Plants Renewed**  
*51002418 Helsinki HELSINGIN SANOMAT in Finnish 16 Dec 88 p 14*

[Text] Licenses for the Loviisa nuclear plants of Imatran Voima were renewed last Thursday. The new licenses will be in force for 10 years, from the beginning of 1989 through 1998.

At the same time, the government decided that the licenses will take effect from the beginning of the year, even if there were appeals. The government justified its decision by referring to the common good. The two plants in Loviisa produce about 12 percent of the electric power consumed in Finland.

The licenses had been discussed in a cabinet meeting a week ago. At that time, the Ministry of Trade & Industry agreed with the license applications in proposing that the licenses would be extended for the entire estimated period of plant operation, that is, until 2006 and 2010. Some ministers favored a shorter licensing period, and the applications were returned to the ministry for a second round of discussions.

The ministry repeated its original proposal yesterday, but the cabinet unanimously voted for 10-year renewals, "even if there were no compelling reasons against renewing the licenses for the requested period."

The cabinet decision applies also to the storage of nuclear waste, and semiactive waste at the Loviisa plants.

The Ministry of Trade & Industry concluded that all requested opinions favored extending the licenses until the end of the estimated 30 years of operation.

## FRANCE

**Uranium Overproduction Looms; Problems Forecast**

*51002419 Paris LE NOUVEL ECONOMISTE in French 30 Dec 88 p 6*

[Article by Jean-Francois Polo: "Cogema: Storm Brewing over Uranium"; first paragraph is LE NOUVEL ECONOMISTE introduction]

[Text] Atomic energy is out. Overproduction threatens.

Uranium and money can be an explosive mixture. They can even be a veritable time bomb. Jean Syrota, the 51-year-old mining engineer hitherto general director of energy and resources for the Ministry of Industry, is replacing Francois de Wissocq at the head of Cogema. His predecessor, who lost a mere 259 million francs on the Matif last year, was forced to resign as president of this Atomic Energy Commission subsidiary engaged in the mining and processing of the uranium for nuclear reactors. In obtaining this belated resignation, Industry Minister Roger Fauroux has got what the prime minister's office (which was unconcerned about discrediting the Matif reactor it had just opened) denied his predecessor Alain Madelin. However, simple financial considerations are probably not the only reason for the change. Cogema is in for some heavy weather. True, its position still appears enviable. Revenues for 1988 should be much the same as for the preceding year (21.6 billion francs), as should profits (732 million francs for the group, even with the hole made by the Matif affair). However, from one end to the other of the nuclear cycle, clouds are gathering. The Chernobyl effect and low prices for competing energy sources have greatly diminished nuclear energy's popularity. The spot-market price of uranium has fallen to \$13 per pound after having remained at slightly under \$20 for years. Overproduction threatens. Cogema is preparing to eliminate 320

jobs at its Herault and Haute-Vienne mines, and it is encouraging countries with which it has technical partnership agreements, such as Niger, to cut back on their own production of the ore.

The economic climate is no better further on in the production cycle. The Tricastin uranium enrichment site may turn out to be too big, given the world-wide slowdown of nuclear programs. (Over the next 5 years EDF will only add one new nuclear plant to its current orders.) The Hague reprocessing plant, which regenerates spent uranium fuel from nuclear reactors, really has Cogema directors in a cold sweat—and not just because of the recent strike there for higher wages. A huge addition is under construction which would triple plant capacity. It represents over 80 million man-hours, 5 million cubic meters of terracing, and 1,000 kilometers of pipe—at a hefty cost of 50 billion francs.

#### Rates

This project has brought one disillusionment after another. Technical modifications during construction

(especially in the computer hardware) have brought delays and increased costs. Worse, cracks have been detected in the two giant, 4-metric-ton zirconium vessels to be used to melt the irradiated fuel. (The builder is Chaudronneries Industrielles de Constructions Spéciales [Special Construction Industrial Boilerworks], located in Migennes [Yonne department]). New vessels had to be ordered.

All these misfortunes spell a 9-month construction delay and an additional cost of approximately 3 billion francs, according to Cogema. The real cost overrun could be even greater.

These problems could not have a worse effect on foreign customers, who account for over 40 percent of Cogema revenues. First and foremost are the Japanese. The Hague plant is to serve as a prototype for a similar 1.8-billion-franc installation in Japan to be completed theoretically by 1996. Chances for meeting that deadline are increasingly slim.

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